# RAILROAD GAZETTE

A JOURNAL OF TRANSPORTATION.

VOL. XIV.—NO. 7. FIRST QUARTO VOLUME. | CHICAGO, SATURDAY, MAY 14, 1870. | $3 per Annum, IN ADVANCE.

PUBLICATION OFFICE, 99 & 101 WASHINGTON STREET, CHICAGO.


INDEX TO RAILROAD ADVERTISEMENTS.

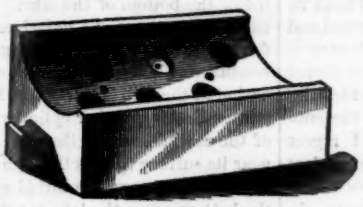

| | PAGE. | | PAGE. |
|---|---|---|---|
| Chicago, Rock Island & Pacific Railroad | 162 | Hannibal & St. Joseph | 164 |
| Chicago & Northwestern | 163 | North Missouri Railroad | 164 |
| Pan-Handle | 163 | Pacific Railroad of Missouri | 164 |
| Western Union | 163 | Pennsylvania & Ft. Wayne | 165 |
| Kansas Pacific | 163 | Erie Railway | 165 |
| Chi., Burlington & Quincy | 164 | Illinois Central | 166 |
| Chicago, Alton & St. Louis | 164 | Michigan Southern | 166 |
| | | Michigan Central | 167 |

*For Table of Contents, see Page 154.*

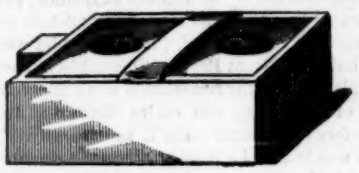

## SELF OILING JOURNAL BEARING.

This invention of Mr. J. P. Wendell, of Philadelphia, was lately the subject of some experimental tests by the Master Car Builders of the Pennsylvania and West Jersey Railroads, and gave such satisfactory results as to lead to its partial adoption on these and several other Eastern roads. One set of the bearings was used on the Pennsylvania Railroad for one hundred days, running eighty miles per day (making a total service of eight thousand miles), and oiled every two weeks. Mr. Van-Houten, the Master Car Builder, certifies that the chambers in the bearing held but four ounces of oil; that at each fortnightly inspection the former charge was found, to be unexhausted, there were no signs of heating, the bearings remained in good condition, and that no waste was used.

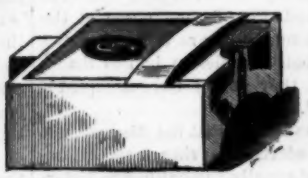
This bearing is adapted to any form or size of journal box. It is cast with an oil chamber in its mass communicating with several circular openings on opposite sides of the face of the bearing, which openings are completely filled by pads of asbestos, black lead and paper pulp (or other porous material) which receive a graduated supply of oil from the chamber through smaller openings, and distribute the same constantly upon the metal surface when in motion. There are also two small openings in the centre of the face, into each of which a wick is fitted, connecting with the oil reservoir; and either class of these openings has been found to furnish sufficient lubrication for service.



*Face View.*



*Top View.*



*Sectional View*

Mr. Wendell claims for his bearing a saving of seventy-five per cent. in oil, of seventy-five per cent. in wear of bearing, and an entire saving of the cotton waste commonly employed. The certificates from the Pennsylvania and West Jersey companies, and verbal reports from several others by whom the invention has been tried, give a strong support to his claims.

## Telegraphic Messages.

The following directions are given for counting of words in a telegraphic message: Any words written after the signature—as, for instance, the address of the sender or his official position—are counted as words to be paid for. However the sender can have his address recorded without charge at the office with the delivery clerk, for the sake of facilitating the delivery of a reply. The date includes only the name of the place,—town or city—from which the telegram is sent, together with the month and day of the month. If there is more than one signature, that is the name of more than one person or firm, all but one are counted in the body of the dispatch.

On the Western Union lines hereafter figures will not be used in the transmission of numbers. The use of figures in telegrams has been a frightful source of error, a single mistake in transmitting or transcribing often making a difference of thousands or millions in the number. For instance, in telegraphing the number, 1,100,000, the omission of the first character would make the amount just one-eleventh as much as intended. If it was written out "one million, one hundred thousand," it would be necessary to omit ten characters instead of one in order to make such a mistake.

# Contributions.

## ENGINEERING.

### *Rock, Earth, and Subaqueous Tunnels—History of Bridge Building.*

BY BENJ. H. LATROBE, C. E.

SECOND LECTURE—SECOND SECTION.

Excavation in rock is made, as you are aware, chiefly by the aid of the drills and gunpowder, of which, as of some other explosives of more recent introduction, I will speak under my next head of *Tunneling*.

This is, indeed, a work altogether of excavation, but its peculiar character and position require that it should be treated of by itself.

*Tunnels* are subterranean passages through hills and mountains, or under rivers and lakes. Of the first description, a great many, and of the last very few, have been executed. I will notice each of them in the above order.

A tunnel through a hill becomes necessary or advisable when it will cost less to remove only just as much of the material as will permit a safe passage, although at a greater expense for like quantities removed, than to make an excavation open at the top. There are occasional cases in which the difference of cost between the tunnel and the open cut would be so little as to leave the choice between them to other considerations. The cubic yard is the customary unit of measure in railway works, and it will usually cost five or six times as much to excavate it in a tunnel as in an open cutting. Each separate case, however, must be decided upon its own special circumstances, which are often of coupled character. Most generally, however, the tunnel is the only work that is practicable in the case, and then the only question is, at what point to end the open cut, technically called the "approach," and to begin the tunnel; and the decision of this question will also depend upon a variety of circumstances. Usually the cut terminates where a depth of fifty to sixty feet is reached, and the tunnel commences and ends where its "portals" are to stand. The line of the road having been carefully worked out upon the ground. and the work begun, the object is next to reach as soon as possible some point within the area of the tunnel, so as to commence its excavation at the earliest moment, as its progress must necessarily be slow, compared with open air work, on account of its confined position and the impossibility of crowding more than a limited force into it. If the tunnel does not exceed two hundred or three hundred yards in length, it is customary to delay the commencement of work within it until the portals are reached through the approach cuts; but if these cuts are long, and much loss of time would result from awaiting their completion, the usual method of hastening the progress of long tunnels is resorted to. This is by sinking wells or shafts, sometimes at or near the portals, but most frequently at some suitable point or points intermediate to them. The tunnel being reached either through the approach cuts or the shafts or both, the process of what is technically called "drifting"—is at once begun. This is regular *mining*, and in my previous lecture I remarked, you may remember, that when I came to speak of tunneling I would be touching upon that branch of civil engineering—it is, however, mining upon a much larger scale than is usual in the pursuit of minerals and metals which are the proper subjects of that department of the profession, and also with a wholly different object. In railroad (or canal) tunneling the purpose is simply to get rid of the material in our way and to open a free passage through it as a commercial highway. It sometimes indeed happens that coal or iron ore is encountered in such tunneling, and these have been turned to better account than raising an embankment or swelling a spoil bank, and it was reported a year or two since that in the famous tunnel of the Alps at Mont Cenis a depository of the precious metals had been discovered which rivalled Aladdin's cave of rubies with emeralds or Sinbad's valley of diamonds. I need scarcely say that this ultra-sensational rumor was coined of the same sort of material with the celebrated moon hoax of some thirty odd years ago.

The operation of *drifting* in a tunnel is two fold; "heading and bottoming"—The usual position of the "heading" when the tunnel is driven by hand labor, as it invariably was until within a few years past, is at the *top* of the area to be excavated. It is called "heading," not so much however for this reason, as that it goes *ahead of* or precedes the removal of the remainder of the section; for sometimes it is better to drive the heading at the *bottom*. This, however, will depend upon the character of the rock to be taken out, for so far I have assumed the tunnel to be in that material, intending to speak of tunnels in earth presently. The heading, then, is a preliminary work intended to open the way in advance and render the removal of the rest of the material more easy. It is usually kept but a short distance in advance of the bottoming or enlargement. When the rock is so solid as to stand in the arched form in which it is taken out in the heading, the work proceeds more rapidly and safely for the workmen; but when it is separated by seams and fissures, or is deficient in hardness and cohesion, it is necessary to use timber props to support it until it can be subsequently sustained by an arch and walls of masonry. Most of the rock in the Allegheny regions and west of it have required to be propped in this manner and afterwards arched, while the tunnels east of our mountains have generally been self-supporting. This is due to the different geological character of the strata, which are secondary or transition in the former, and primitive in the latter district of the country.

During the progress of excavating a tunnel ample provision must be made for ventilation and drainage. The first is effected by blowing machines which drive fresh air to the headings and expel the smoke of blasts, and the second by pumps which raise the water, which is often found in copious quantity, to the surface through the shafts, except where it is enabled to pass out at the portals by natural flow. In rock tunnels the material necessarily has to be removed by blasting; holes two and three feet in depth and 1½ to two inches in diameter, being first drilled and charged with gunpowder, are fired either by a slow match, called a safety fuse, or by the electric spark. The latter mode of firing is now coming into general use and is incomparably the best, both for its superior effect, which results prove, discharging all the charges simultaneously, and for the greater safety which it secures for the workmen. The electricity is generated either by a galvanic battery or a portable machine of the frictional kind. The latter is regarded as the most economical and readily handled. It is placed at a safe distance from the place of discharge in the rear of a bulwark, generally about a hundred yards off, behind which the workmen retire during the explosions. Common gunpowder is still the agent chiefly employed in blasting, both in open work and tunneling, but other explosives have been proposed and partially used, and with more or less promise of advantage, the most powerful of which are gun-cotton and nitro-glycerine. The last named of them has met with the most favor in this

country and has been used with excellent results upon several works. It is, in fact, not more liable to explosion than gunpowder, if handled and kept with due care, but its explosions when they do occur are more destructive, just as a high-pressure boiler when it bursts does more mischief than a low-pressure, and yet is not the less used or useful on that account.

The most difficult and costly part of the work in rock tunnelling, as in all rock excavation, is the drilling of the holes, and this has led to many ingenious efforts for years past to invent a machine which would perform this operation more rapidly and cheaply than hand labor. These essays, although long abortive, have within a few years produced a piece of mechanism which satisfactorily accomplishes the object. It was first successfully introduced into use some seven or eight years ago, at the Mont Cenis Tunnel, the great length of which (upwards of seven miles) demanded the utmost expedition in its workings. The machine is somewhat complex in its arrangement and composed of too many parts to allow me to attempt a detailed description, and I must be contented to say that it consists of a steel drill-rod or bit attached to the piston of a small cylinder, within which it works with a rapid reciprocating motion like that of a common steam engine. The drill is thus driven against the rock and rebounds therefrom too many times in a minute to be readily counted, and is so contrived as to turn around slightly at every blow and also to advance regularly as the hole deepens. It may be worked by steam in the open air, but in a tunnel it is necessary to substitute compressed air, which is not only an equally effective power but has the additional and invaluable recommendation of supplying fresh air to the workmen and of assisting to expel the smoke of the blasts. A number (usually from six to twelve) of these compact and animated little machine-drills are mounted together upon a strong iron frame supported upon wheels and rolling upon a track on the floor of the tunnel, by means of which it is advanced to its work at the heading and retreats out of danger when the charges are fired. The air is compressed by proper machinery at the ends of the tunnel and conveyed in iron pipes to near the heading. As the work advances these pipes are prolonged, and the air is carried from them to the machines by small flexible tubes. The drills may be made to point in any direction. Each of them is attended by two men, and does the work of a great many, and it must be added with a more deafening clatter than that of a cotton factory. By the aid of this important auxiliary the seven-mile tunnel at Mont Cenis, in Italy, and the five-mile one at the Hoosac Mountain, in Massachusetts, are advancing at a rate which will insure their completion in less than a third of the time which they would have occupied if driven by the old method.

You may be surprised to be told that the *diamond*, not the sparkling one which adorns the ring or the breast-pin, but the *black diamond*, equally hard, although lusterless, has been most efficiently used in another form of drill, which, by a rapid revolution, *grinds* out the hardest rock with incredible speed.

Before leaving the subject of drilling machinery I will mention that attempts, impelled by genius rather than guided by judgment, have been made to construct a machine which, operating upon the principle of an immense auger, would bore the entire tunnel out of the rock at one operation, or rather approach so near to doing this as to leave the gunpowder but little to do to complete the work. These machines, which assumed more than one form and were actually set to work at two or three places, were found to be altogether too heavy, complicated and consumptive of power and costly in repairs; and, being fundamentally false in principle besides, were immediately seen to be failures and thrown aside.

*Earth Tunnels* present many points of interest different from those attendant upon tunneling in rock. The material through which they are driven, while it does not require the drill and the explosion to loosen it, needs to be supported at each step of its advance, and the consequent delay and expense is sometimes much greater than that of having to resort to blasting. The manner of propping the roof and sides of the excavation, of draining the water which is nearly always found in earth tunnelling, and building the masonry which is invariably necessary to secure the work, could only be fully shown by a series of drawings such as could not be satisfactorily exhibited to a large audience at a distance. There was at first a good deal of trouble in carrying the excavation and arching through a decomposed rock saturated with water at the west end of the Hoosac Tunnel. The method pursued was essentially the same with that generally used in England in earth tunnels. The French and German modes of proceeding are somewhat different in details, and the Austrian appears to be more effective than any, but I can only thus briefly allude to them.

Besides the two great tunnels already mentioned, there are very numerous others in Europe and America of various lengths, from less than a hundred feet to three miles, and in every variety of material, from granite rock to quick-sand. The mere enumeration of them would occupy more time than remains to me.

On the Belgian railway from Liege to the Prussian frontier in the direction of Aix la Chapelle, the route, for some twenty miles pursues the valley of the Vesdres, and consists of a succession of twenty tunnels and as many bridges, the tunnels varying from 65 up to 1,964 feet in length, so that there is a tunnel and a bridge for each mile and a quarter in the length of the road.

The Parkersburg Branch of the Baltimore & Ohio Railway, of 104 miles in length, has twenty-three tunnels, the longest of which is half a mile; and the main trunk of the same road has eighteen tunnels, making forty-one in all. The longest of these is the Kingwood Tunnel, a little more than three-fourths of a mile in length. All of these tunnels are in rock arched with masonry.

The "Rockfish Gap Tunnel," on the Virginia Central Railroad, completed some years ago, is of about the length of the Kingwood, and the "Stump House Mountain Tunnel," on the Blue Ridge Railroad of South Carolina, will be a mile long when finished. The Allegheny Mountain Tunnel, on the Pennsylvania Central Railroad, is two-thirds of a mile in length.

Of the English tunnels the longest is the "Woodhead," three miles in length. This is a double tunnel through hard rock the entire distance. The Nerthe Tunnel, in France, is of nearly the same length, and also in rock. In Germany and Switzerland there are many tunnels, but none of the length of the longest just mentioned. The tunnels upon the Sœmmering Railway, upon the line from Vienna to Trieste, are numerous, as the route is of the most rugged Alpine character. The railways of Italy which cross the chain of the Appenines have always many tunnels.

*Subaqueous Tunnels*, the class of tunnels which remains to be noticed, and of which there are very few examples so far, although their number will no doubt greatly increase hereafter, are tunnels under rivers and lakes. The first construction of this kind belongs to a very remote historic period, that of queen Semiramis, who is said to have connected the two shores of the Euphrates within the City of Babylon by an archway under its bed. The earliest subaqueous tunnel of modern times is that under the Thames at London, projected and executed by one of the most distinguished engineers of the age, the elder Brunel, (father of him who designed and built the Great Eastern Steamship.) The difficulties attendant upon this remarkable work might be the subject of more than one entire discourse, and I regret therefore that I must notice it so cursorily. The object of it was to afford a passage across the river below where the shipping lay, and where a bridge would have obstructed approach to the docks. The tunnel is about 1,200 feet in length, or nearly a quarter of a mile. It is composed of two arches, side by side, the intermediate pier being perforated with arched openings communicating from one to the other. The bed of the river consists of successive strata of blue and red clay, sand, mud, and marine shells. The excavation required to contain the mass of brick work was thirty-eight feet wide and twenty-three feet high, in which the arches for the carriage and foot-ways were formed. The top of this excavation was separated from the bottom of the river by a thickness of only about twenty feet, under a depth of water at low tide of ten feet, and at high tide of thirty feet, the pressure of the water thus varying enormously at different stages of the tide, and vastly increasing the hazards of the work. To protect the miners engaged in the excavation, a moveable iron structure or shield, of most ingenious design and massive strength, was devised, and as it was pushed forward by powerful screws, it was closely followed by the brick work, laid in water cement. The river broke in several times during the progress of the work, inundating the tunnel, and giving barely time for the workmen to escape drowning. The indomitable courage and inexhaustible resources of the engineer, however, vanquished every difficulty. The cavities in the bed of the stream through which the water rushed were stopped with bags of clay and tarpaulins sunk upon rafts and put in position by the diving bell. The mephitic gases generated by the foul deposits in the bottom of the river sometimes almost suffocated the workmen, and so soft and semi-fluid was the material in which they originated that it could best be removed by the naked hands of the miners. The tunnel was commenced in 1825, and completed in 1842, at a cost of upwards of $2,000,000. Of this period of seventeen years, not more than one-half was actively employed, as it was for the remaining time in a state of suspension. The tunnel was reached by means of a haft at each end, fifty feet in diameter and sixty feet deep, with winding carriage and foot-ways. The carriage-ways have, however, never been constructed, and the foot-ways consist, at present, of spiral stairs, roughly made of wood, which admit the passenger or the visitor to the archways. One of these only is left open as a passage for pedestrians, while the other is used as a store-house for lumber and rubbish, except the part appropriated to the stock of guide books and other cheap literature, and of such small merchandize as is usually offered for sale in places of popular resort, not forgetting the beverages prescribed where damp air is to be kept at bay. It will naturally be inferred by those of my auditors who have not informed themselves of the history of this truly noble work, hitherto used for purposes so unworthy of the grandeur of its conception and the perfection of its execution, that it was an unwise undertaking, and such was my own conclusions when visiting it not long since, when, however, I was relieved to learn that it was at length about to be turned to account as a *railway* tunnel, by extending it either way upon the two shores of the river until it should emerge into the open air.

The city of Chicago, so deservedly noted for her rapid growth and enlightened enterprise, has recently had a tunnel constructed under the river which intersects her streets, the crossing of which by her teeming population over drawbridges, repeatedly open to allow the passage of her large marine, has become attended with intolerable delay. This tunnel is 886 feet long, with a double carriage way and foot-walks, and with its open approaches is upwards of a quarter of a mile in length. Although not unattended with difficulties, chiefly due to the necessity of keeping open the navigation of the narrow and crowded river, it was an easy work compared with the Thames Tunnel, as it was built in an open excavation subsequently filled over, instead of being drifted under the bed of the stream.

The same prosperous city has executed another subaqueous tunnel for a different but not less important purpose, that of obtaining pure water from Lake Michigan, in order to do which it was necessary to remove the point of supply far out from shore and quite clear of the noisome discharges of the river. A hollow crib-work of timber filled with stone was therefore sunk two miles out in the lake and connected with the powerful pumps which elevate the water into reservoirs for distribution by a brick conduit five feet in diameter and thirty feet below the bottom of the lake. The excavation for this conduit was through a tenacious blue clay of very uniform consistency and requiring no propping while the conduit was being built. The water at its outer termination at the crib is thirty feet in depth, and the large perpendicular pipe or cylinder which stands on the end of the conduit, within the crib, allows the water only near its surface to pass through the conduit, so as to avoid drawing on the turbid water which is found near the bottom when the lake is agitated by the winds.

The success of these subaqueous works has led to still bolder projects of the same kind, and some of you may have had your wonder as well as your incredulity aroused by hearing that it had even been proposed to establish a submarine communication between England and France by means of a tunnel of sixteen miles across the British Channel, and that this audacious chimera had possessed the imaginative brain of more than one member of my profession. It is so dangerous, in this age of progress, to predict the failure of any scheme, however daring, that I will be excused from observing a little reticence as to what I think of the one now referred to, although I must say that it looks provokingly feasible. A much more feasible project of connecting the United States and Canada by a tunnel under the Detroit river, which forms the link between Lakes Huron and Erie, has been broached of late, and as it is in the hands of the able engineer who constructed the Chicago tunnels, I look upon its construction as a probable and perhaps not far distant event. I must, however, now dismiss this branch of my subject by the remark that there is really no practical limit to the *length* of a tunnel, provided it can be got *at* by means of shafts at a sufficient number of points, so as to allow of the removal of the material and the drainage and ventilation of the work. Hence, when consulted lately as to whether a tunnel ten miles long across the Allegheny range in Virginia was practicable, I had no hesitation in answering affirmatively, the conditions just mentioned appearing to exist in the case presented to me.

I now come to perhaps the most interesting class of constructions connected with the railway, and not with it alone, but with every kind of artificial highway, *viz.*, *Bridges*. The technical definition of the means by which the passage of water-courses of every description is effected need not be here given; for we, all unlearned as we may be in engineering science, know well what is meant by a *bridge*. When the railway was first introduced, however, the classic name of *viaduct*, was applied to the larger class of structures,

and for a time threatened to supercede its more homely Saxon synonyms; but the latter soon resumed its place in engineering nomenclature, at least in America; and we hear of viaducts no longer, except as applied to a few structures to which they became familiarly attached, such as the "Carrollton." viaduct, at the boundary of this city, and the "Thomas" viaduct at the junction of the Washington Branch of the Baltimore & Ohio Railroad.

The rivers of a country interposing more frequent and formidable impediments to its communications than any of its other features, the means of passing them by erections which could be used for that purpose in all their various conditions of high or low water were among the earliest works of nations emerging from barbarism. It would be time lost to speak with any details of the primitive expedients of half savage tribes, where the ford, the raft, or the canoe began to be succeeded by the felled tree or the stretched rope. Passing by, also, the slight historical notices of bridges built by Semiramis, Darius, Xerxes and other Eastern monarchs, no traces of which remain, we come down to those of the Romans, which, although worthy of admiration, were yet, in some respects, inferior to those which preceded them even some centuries back, and immeasureably behind the stupendous structures of the present day. The famous bridge of Julius Cæsar, which has puzzled so many a young Latin scholar, myself included, was in fact only a military expedient for crossing a river, was built of timber in ten days by his soldiers, and did not long withstand the rapid current of the Rhine.

The bridge erected by the Emperor Trajan for the marching of his army across the Danube to attack the Dacians was a remarkable structure, although historians differ as to whether its arches were of stone or of timber —most probably the latter; but this question cannot now be decided, as but some of the piers remain, the bridge having been destroyed by his successor Adrian to check invasion by the same barbarians.

After the fall of the Roman Empire scarcely any constructions of stone were executed until the twelfth century, when a religious order arose called "Brothers of the Bridge," who built houses of accommodation for travelers and erected bridges over unfordable streams. Many interesting structures of this descriptio n were constructed by this worthy association, with which, in that age of adventure, many a romantic incident of travel was doubtless connected. I regret that time will not permit me to give you some details of this era of bridge history, which lasted to the close of the fifteenth century. The bridges built during that period were constructed with great economy and of inferior materials and workmanship, and although many of them were of considerable length and across wide rivers, they were so narrow as to be scarcely passable by wheeled carriages, while the towers which protected them indicated the disturbed times in which they were erected.

During the sixteenth and seventeenth and the early years of the eighteenth century the bridges, especially those built in France under its monarchs who flourished during that period, were of a much more substantial character than those just noticed. But it was not until the establishment of the celebrated "Corps des Ponts et Chaussees" in 1720, in the reign of Louis XV., that the construction of bridges, as well as that of roads, assumed the position of an art based upon sound scientific principles. Since that date it has steadily advanced, and during the last half of the eighteenth century many bridges were erected in France which will remain as permanent monuments to the genius of her civil engineers.

Germany, although her people have always been distinguished for their skill in the mechanic arts, yet in this department of bridge construction in stone, with all the embellishments of architecture accompanying it, followed slowly in the wake of France; and England began to be awakened by the example of her neighbor to the necessity of improving upon her "Old London Bridge," built in the twelfth century, the piers of which were half as thick as the arches were wide, and which, supporting a row of antique houses, constituted the next thing to a mill-dam across the river, so seriously did it obstruct the free flow of the current. The earlier bridges here referred to were all of stone, supporting on heavy piers arches generally of small span and of a great variety of forms, some semicircular, some segmental, some elliptical, and a few Gothic, which last (the worst adapted of all to the passage of water) was that of Old London Bridge, indicating the ecclesiastical age in which it was erected, and perhaps with the idea that the style of arch rendered sacred by its use in the church and the abbey would give a religious character to the structure and so help to protect it from the floods of the river it spanned.

The course of improvement from this time tended steadily towards extending the spans and so reducing the number of piers and enlarging the water way. There were indeed from the twelfth to the seventeenth century several bridges of large span erected, but so inartificially that it was rather to be wondered at that they stood as long as they did, there being few of their remains now left. The extension of the openings of a bridge has the manifest advantage of diminishing the number of intermediate supports, and consequently the difficulty and cost of the foundations; while on the other hand the expense of the superstructure is necessarily increased, and in a much more rapid ratio than the increase of the span.

These two elements of the bridge (the foundations and the superstructure) have therefore certain relations to each other, upon the proper establishment of which by the engineer in the particular case which he has in hand must depend the economy, the stability and the beauty of his work. I will speak of them, therefore, in succession.

TO BE CONTINUED.

## RAILWAY MANAGEMENT—ITS SYSTEM OF ADVERTISING.

*"How this World is Given to Lying."*

BY PAUL STORK.

Ever since my mind, by slow and imperceptible expansion, was first competent to grasp the news contained outside the local columns of our daily paper, with short intermissions, sometimes extending over a month or so, I have been habited to read how the gloomy monarch of all the Russias plunged his royal finger into the murky ink and drew a heavy line straight from ancient Moscow to the pleasant city of St. Petersburg, and then with flaming eye and heavy breath roared in deep sepulchral voice: "That shall be the line of the great railway!" I am and always have been very fond of this romantic incident, and never, knowingly, have failed to read all the particulars that the papers print from year to year concerning it, and whenever any writer treating of the Russian empire neglects to give to it the prominence that it deserves, I cannot help doubting that he or she is wanting in good taste or else is ignorant of the most charming incident known to Russian history. But I have been much exercised of late at the awkward clumsiness of certain obscure writers, who, failing utterly to appreciate the grandeur of the situation, make the haughty monarch lay hold of an ignoble goose-quill and thus draw the magic line that the pliant courtier afterwards followed so assiduously. Such men can have no marrow in their bones; the good old-fashioned accounts all concur in this, that he dipped his finger in the ink and with the extremest end thereof marked the route that should be followed. So well authenticated a fact is this that the historian, Baron Shakkumup, states—and his statement has been accepted by every writer of distinction, with only two exceptions,—that the fore-finger of the right hand was the one made use of by the august Nicholas, and, further, that afterwards, with a playful absent-mindedness peculiar to despots of every magnitude, he cleansed the inky member by drawing it with slow precision through the open mouth of an attentive listener.

As I said before, it has grown to be a habit of mine to love to pore over all the pleasant details of this eventful incident in the life of Nicholas, but it is a great mistake to suppose that the Russian line is the only extended railway that runs as straight as a crow could fly. The malevolence of our editors, coupled with what I must term a base admiration for everything that is foreign, has led them to systematically ignore the fact that there is not a trunk line or prominent road in this whole country of ours that does not rival in directness the road from Moscow to St. Petersburg, It is a little remarkable that a class of men so patriotically alive to the superior excellence of our political institutions should so persistently misrepresent us in this our railway system. It certainly cannot arise from ignorance, for if the number of tickets annually consumed by the responsible editors with their reportorial corps, and so on down to the ubiquitous little "devil" is any indication, then must they pass the greater portion of their laborious lives in voyages of adventure and discovery upon our many different lines of railway. A sense of kindly courtesy then, if nothing else, ought to forbid misrepresentation. For I appeal to the truthfulness of an enlightened and observing public if they in all their travels ever discovered a solitary instance where any railway diverged so much as a hair's breadth from a straight line, unless it was in isolated cases where the curves only served to make the distance shorter. If any skeptic doubts this I confidently refer him with all his friends to the fifty, yea the hundred, maps of different roads that he will find in every waiting-room, hotel and eating house. He will not need glasses or a very close inspection to discover on each and every one of them the mark of the Emperor's finger running straight as ever plummet fell and cutting in its course, with like indifference, the highest mountains and the broadest rivers.

The information given by these maps and posters is quite extensive, and many are the extraordinary things they tell, useful alike to old and young, but they are not, nor ever have been, furnished, as some suppose, by the lately deceased George Peabody nor by any other philanthropical or deceased gentleman. On the contrary they are yearly issued in great abundance, sometimes with frames complete, by our much abused but ever thoughtful and unselfish railroad companies. Let the traveling public heed the truths they tell, nor read too many of them, then will they all avoid the waste of time and money and the loss of opportunities that follow the frequenting of obscure and unpicturesque routes, void of mountains and free from tunnels, with no waterfalls or lonely islands worth mentioning, not even a sequestered glen, once the abiding place, perhaps, of a powerful and warlike nation whose mighty chieftains with their mild-eyed dusky wives have one by one long since taken up their silent and toilsome march towards the setting sun or the happy hunting grounds that lie beyond.

With that firm and trustful confidence that ever characterizes truthfulness and unsolicited benevolence, our railway companies fling these, their banners, to the popular breeze. The information that they give, save the heavy line that marks the road, may be and is no doubt a little stale. Possibly the trains do not move as therein stated, but the traveling world is not thought to attach much if any importance to things so trivial. Observe attentively the line of names affixed with so much modesty to these several maps and posters; they are all of them well-known gentlemen, men deservedly held in high esteem for the excellence and the purity of their private lives. When we see such men announcing in shining map and flaming poster that their particular line is much the shortest and carries in its palace trains a trusty corps of nurses wet, of morals good and frames approved, expressly for the benefit of mammas young and sensitive, or babies motherless, then do we think that those who doubt display a concious meanness too despicable for words to paint; but what student of the human character has not had his heart sink dead within him at the groveling nature that similar base suspicions but too clearly indicate. How can they doubt when every bill and poster states each fact so clearly, and further shows, gratuitously, the zigzag course pursued by all other lines? But it is a truth, though a sorry truth to tell, no one believes a thing they say. It has been clearly demonstrated, and if you'll go on I'll tell you all about it.

When I was posting for the great Southern Equatorial Railway Line, I never could quite shake off a nameless fear I had that, while my maps and posters were prized as ornaments by certain classes, they were quite generally ignored by every one who traveled, not forgetting the poor Irish and Norwegian immigrant. But the tormenting fear that haunted me I never told to man or boy until some time after I had been promoted to another branch of service. Then it was that I made known the horrible dread I had, and horrible it was too, toward the last. It was many long years ago, still to this day there is ever ringing in my ears the chuckle of fiendish laughter that echoed back the stroke of my hammer as I nailed the posters up. A ghastly grinning imp seemed always mocking me from out the shining glass that so nicely covered and protected our finely colored maps. He chased me from the cars into the station-house and back again as I hurriedly posted the latest circular; into my seat he followed me nor left me on my pillow but hissed continually in my ear "Idiot! gosling! who believes your posters and your maps! Go home and go to raising babies."

My brother posters at first all stoutly denied ever being haunted by any such impalpable substance, but afterward, as one by one they came to earn their bread in other ways, they all owned up that some unkind and devilish sprite, no doubt akin to mine, had ever dogged their footsteps and destroyed their peace and quietude of mind. When this accumulated evidence, the truthfulness of which our haggard faces and lank frames too truthfully attested, came to the ears of the sagacious managers of the Great Southeastern Equatorial Line, a meeting of the directory was at once by special call convened, and then and there, within the sombre precincts of that awful room wherein the hopes of many a high aspiring porter had chilled and withered in days gone by, the war of posters instantly commenced. The Anti-Posters were clearly the weaker of the two. Chancellor Gust, with his coadjutor Vice-Chancellor Glow, marshalled the forces of the Posters party with consummate tact and show. Projectiles of inconceivable magnitude, loaded with wind and kindred elements, were hurled without cessation at the parsimonious Anti-Posters. but the Anti-Posters being firmly perched upon the old and favorite hack, economy, were not at all dismayed but

retorted with arguments of learned length and thundering sound all based upon retrenchment and reform. Awhile the Posters were jubilant and seemed masters of the situation, but anon the Anti-Posters would collect their rested forces and by one mighty effort caused their enemies to quake with dreadful fear. Meantime the many trimmers of the Equatorial line ranged themselves with awful fierceness and envenomed hate under the colors of whichever side seemed almost on the point of winning. But, as the day jogged on, victory to the Anti-Posters party seemed farther off than ever, then quickly did these valiant trimmers very cautiously begin to trim their little sails. At first their efforts in this line went, mayhap, no further than a longing stare or pleasant nod to some one of the many Poster followers, but soon they might be seen in full and friendly confab, no doubt exchanging secrets of the greatest consequence or speculating with the very liveliest interest on everything that concerned the fortunes of the mighty men that led the forces of the Posters and their enemies the Anti-Posters. While the trimmers rested peacefully in the bosom of the Poster faction, the leader of the Anti-Posters, a shrewd far seeing man, gave utterance to a confident assertion, and immediately through channels strange and crooked it instantly found conveyance with exaggerations of the queerest sort to every Anti-Poster great and small; then it was that the unhappy trimmers, just fairly ranged upon the other side, were seized with dire and dreadful doubt. Could it be that they had acted all too hastily? Undoubtedly; and soon the sturdy Posters, as they rested on their arms, their eyes fixed to'rds the front, beheld the threatening fist or weakly smile of these same trimmers, gleaming at them from out the ranks of their opposers. How long this poster war continued, or the many mishaps that befel its followers, I cannot now relate, but after a while the arms were stacked, and as a just concession to the kind providence that had fed and clothed them all—by providence I mean the Great Southeastern Equatorial Line—a committee was appointed with power to send for persons or for papers, anything in fact that promised peace to the contending factions. While the object had in view by this committee was fully appreciated by the majority of its members, still, the obstacles to be surmounted were not thought to be so very great. At once a sample copy of each poster ever issued by the Great Southeastern Equatorial Line was asked for by the Chairman; however, that comparison might be made, similar copies for all continuous lines were next demanded. The Chairman, with a wisdom never shown before or since by any other Chairman, had appointed me as Secretary with all necessary power. Hurriedly I secured my collecting agents, (for no posters were kept on file), while I myself proceeded with all haste to rent or lease the many vacant elevators, barns and other buildings that the town offered for the purpose of the poster exhibition. But once my agents had fairly got to work I saw the folly of attempting to give each poster the due prominence it deserved if I confined myself entirely to the interior walls of empty buildings. I hesitated, and, must I own it, the sight of all these posters aroused again to life the demon that had followed me in earlier life. My mind began to waver. Meanwhile the posters were steadily pouring in, when happily a dyspeptic Anti-Poster, gloating over the ruin he had caused, suggested with diabolic malice that the outside of buildings might not improperly be used. Reanimated, I thanked the Jew for the unintended word of kindness, and at once the sound of the hammer and the splash of the glue-brush resounded throughout the town. Empty or occupied, it mattered not, every building was thickly covered with its allotted posters; then we pasted them to straggling carts, stray horses, and wandering curs. The fences were not forgotten, and these the busy workmen followed far into the neighboring States. But it was evident nothing now could save us; we had raised a spirit impossible to quell while there was room to stick to any animate or inanimate thing. The demon that always haunts the Posters was having his revenge. The depot platforms were groaning under the weight of accumulated posters impossible to take away; cars loaded with them filled every siding; every moment a dispatch reached me from some collecting agent announcing the departure of fresh trains all loaded down with posters, and oh, most unkindest news of all, many of these agents had not yet got fifty miles away, while others were still collecting through the town. Despair again seized hold of me, and had not congestion of the brain kindly come to my relief I should not now be here to tell my little story of the railway posters. When strong enough to travel they carried me by easy stages far out into the quiet country, where the footsteps and the impress of the Poster man were quite unknown. But, as years wore on and strength returned, my good old nurse little by little imparted to me the subsequent history of the poster question. The committee, so it appeared, arrived the very day that I was stricken down, and seeing the magnitude of harm that had been done the city, instantly sent word to each collector to desist. The heaped up posters were, as expeditiously as possible, shipped off to the different paper mills throughout the country, and the proceeds of the same were at once applied, by order of the Board, to the liquidation of the bonded debt of the Great Southeastern Equatorial Railway Company. But, as Chancellor Gust still insisted upon the efficacy of maps and posters as an enticement to unwary travelers, it was decided in Committee of the Whole to collect such information as was possible from the patrons of the Equatorial line. But how to do it was the puzzle. However, a happy inspiration seemed to seize them, and everywhere, throughout the Equatorial region round-about, the following notice was hailed with wonder and surprise wherever it appeared:

"To All, Greeting:

"The Great Southeastern Equatorial Railway Line, "being happily free from debt, with a handsome surplus "in its treasury, anxious to solve a great and ever growing "problem in railway economy, confidently makes this its "proclamation, namely: A reward of **500,000** shares of "full paid common stock will be issued, any time within five years, to any person, firm or corporation, over "seven years old and not now or previously an inmate of "any idiot or insane asylum, that will take oath, or "produce the evidence of one witness good and true, that "they or he or she or it have at any time, subsequent to "the period before stipulated, been inveigled or induced "to patronize the Equatorial line, to the exclusion of any "other, from information furnished in reference to the "directness, connections, or the superior excellence of its "line, from any map, poster or card ever issued by or "belonging to the Great Southeastern Equatorial Railway. "All communications either personal or by post should "be addressed to

"Ex-Chancellor Core."

Many were the craftily laid traps and checks concocted by the Ex-Chancellor to expose and snare any who should seek through fraud to grasp the five hundred thousand shares of full paid common stock. However months went by, and the sharp Ex-Chancellor Core had almost gone to sleep, when suddenly, at noon one day, the great Southeastern Equatorial Line was startled and amazed by the abrupt appearance of a claimant for the prize. Many were the questions asked and answered, and, when he seemed just on the point of winning, a chance interrogation put by Vice-Chancellor Glow completely dashed his hopes. *He could neither read nor write* and was besides an old and favorite inmate of the Universal Poor House. Ex-Chancellor Core felt sorely the great indignity that had been put upon him, and the following touching letter only added fuel to his ire:

"Northern Passage,"

"Ex-Chancellor Core;

"I am the last surviving member of Sir John Franklin's "crew. I pine, an unhappy and forgotten blubber-"eater, amid the eternal snows of Iceland. I am an only "son and the last representative of an affluent grubber. "At the tender age of forty-three I tore myself with "many tears from the protection of a loving mother's "arms and the sustaining care of dear and kind old "father and prepared to seek my fortunes in fields less "charred and stumpy than the back woods farm upon "which I had been reared. I saw your posters at the "station-house and long and anxiously perused them, "but just as I was on the point of going your way, a lad "that passed, no doubt an orphan, muttered to himself "'hi mister; but 'ur a green 'un.' I'm naturally sus-"picious, and this remark of the orphan boy I instantly "construed to be a Providential warning, and so I took "another route. But still I think my claim comes very near "the mark, but if you think the contrary and yet are still "disposed to show some slight appreciation of the nat-"ural innocence so clearly indicated by the impulse, that "only fled at the cry of the little orphan, then will you "send me a barrel of good salt pork and at least five "hundred tiers of the blackest plug tobacco. I have not "tasted either since good Sir John with all his crew "first landed on these shores. Your posters are first-"rate, send me a few and I'll gladly hand them round; "several of the Esquimaux hotels were overlooked when "last your agent passed this way. Peter Gull."

The disgust engendered by this letter so permeated both the Poster and the Anti-Poster party that posters were ever afterwards tacitly tabooed by the Great Southeastern Equatorial Railway Company, and thus it is that while the line is known to everybody, it has no posters and appears only in the standard maps.

---

—The State of Maryland has commenced suit against the Baltimore & Ohio Railroad Company, to recover the value of gold over currency, in which the State has been paid its 6 per cent. dividends on the preferred stock, which now amounts to nearly $2,000,000. The claim is based on the recent decision of the Supreme Court.

## HINTS ON TRACKLAYING.

BY WM. S. HUNTINGTON.

### SPIKING ON BRIDGES, CULVERTS, ETC.

A great deal of valuable timber is destroyed and track rendered unsafe, on bridges, culverts, etc., by using common spikes, which act as so many wedges to split the stringers or rail-plates. When the tracklayer is not furnished with bridge-spikes, he should provide them himself, by having the blacksmith take a sufficient quantity of common spikes and sharpen them so as to reverse the points. This will prevent the splitting of rail-plates, or checking them, which lets in water, causing them soon to decay. There are a great many bridges where the stringers are so decayed that the spikes can be pulled out with the fingers. The main body of the timber may be perfectly sound, but a line along the base of the rail, on either side, and under the rail will be so far decayed that the spikes will work out by the jar of passing trains; and on some roads it is not uncommon to see trackmen picking up the spikes and driving them in a new place; or, if this has been done so many times that *there is no new place*, they make one by plugging a hole, or filling it with sand in the soundest place they can find.

Thousands of rail-plates are now laying by the roadside rotting which might safely have done duty for years longer had they received proper treatment. Such timber as is used for this purpose is expensive, and no railroad company can well afford such wanton destruction of property. Of course these timbers should not remain in the track one minute after they become unsafe, but with proper usage, they will do service much longer than with such treatment as they too often receive.

Rail-plates should be securely fastened to prevent spreading. This is often neglected, and might possibly be the cause of a first-class smash-up; but if a broken wheel, or a bent axle, were found among the wreck, it would sound better to charge it to that.

### CATTLE GUARDS

are sometimes constructed by digging a narrow, shallow pit, and covering it with slats. Perhaps no more ingenious device could be employed, if it were desired to kill or maim every animal seen at a road crossing. As a trap, it is perfect; but as a guard, entirely worthless. The frightened animal fancies he sees a safe way of escape, and directly becomes entangled in the slats and is held until crushed by the train, which is not unfrequently thrown from the track and more or less damaged. Many railroad companies have frequently been brought to grief by this sort of trap, and yet they continue their use. The most effective cattle-guard is a deep, open pit left as open as possible, not even with cross sleepers, as they also make a trap similar to slats. These pits should be strongly walled up, either with masonry or timber, (the former is preferable but it is difficult to obtain material in some sections), and the track laid on stringers in a substantial manner, and not cobbled up on ties or fence posts, as is frequently the case. Nothing gives our railroads a more poverty-stricken, slovenly appearance than this shammy manner of building cattle-guards and culverts. It is no excuse that the company is poor, as a poor company cannot afford to do work in this manner. Perhaps wealthy companies could get along in this ship-shod manner for a while, but they are not likely to undertake it, as managers of such companies are more likely to economize by thoroughness in construction.

In laying iron on cattle-guards, open culverts, etc., care should be taken that the joints do not come on the end of the stringer, outside the face of the wall or abutment. If the joint is near the end of the stringer, it is likely to injure the masonry by rocking as trains are passing. It is far preferable to bring the joint near the middle of the timber, as it will be less likely to disturb the masonry. This can be easily arranged by laying a few lengths of short iron just before reaching the culvert or cattle-guard; or, if there is no short iron at hand, it is better to cut a length for that purpose, as the pieces need not be wasted; they will be wanted for guard-rails or something of the kind. The same care should be exercised in regard to road crossings, except that its joints should be brought outside the planking. This cannot always be done, owing to the length of track that must be planked; but there are many crossing that may be laid with no track-joint in the planking, and this can be done with little or no trouble to the track-layer, while it will save a great deal of trouble to the section master and expense to the company. The principal objection to a joint in a road crossing, where it is covered with plank, is, that it is frequently necessary to disturb the crossing for track repairs, and to do this the planking must be taken up, which often results in the splitting of the planks, so that new ones must be furnished, or the crossing is not left in a safe condition. Many times frost remains under the planks,

when it requires a vast amount of hard labor with pick to accomplish the necessary repairs, when but for the joint being in the crossing, the repairs would not be needed, for this reason: It is well-known that the joint-tie is more likely to settle than any other, and water will settle under the ties in crossing, and remain there a long time, after it has entirely left other portions of the track; so that the joint in the crossing needs frequent raising to keep it in surface, while if the joint was outside the planking, it would be easily accessible for repairs when needed. There is no Section Master but has experienced more or less trouble with joints in road crossings; and as this trouble is paid for in cash, it would be well for those in charge of track-laying, if they have any regard for the interest of their employers, to give it their attention.

LAYING TURNOUTS.

It requires considerable skill and a great deal of judgment to lay a good turnout, and there are a great many track-layers of considerable experience that can hardly be persuaded to undertake the job under some circumstances; and there are also many others, of limited experience, who will readily undertake the most difficult job in that line. It is the latter class of men who eventually make the best track-layers; but railroad companies in whose employ they are, must first suffer somewhat in consequence of their willingness to undertake what they (the track-layers) think they perfectly understand, when, in reality, they know but little about it. They generally discover this fact after a few more years' experience, and this discovery is of great value, both to them and their employers.

Engineers have published books giving instructions for placing frogs, staking out work, etc., containing much valuable information on the subject; but as it is difficult, and frequently impossible, to follow strictly any given rules in laying turnouts, the track-layer is forced to rely mainly on his own judgment and experience. The principal difficulties to be encountered by track-layers of limited experience are in getting the frogs the proper distance from the switch and the right distance apart when more than one frog is to be laid.

When a double turnout is to be laid from the main track, on straight line, one to each side of the main track, it is not a difficult affair; provided the frogs are of the right size and length in relation to each other. Of course the two long frogs should be of equal length, and placed opposite each other in the main track. When these two frogs have been put in place, it is easy to ascertain the proper location of the short or centre frog by drawing a line (a good fishing-line is the thing) from the turnout end side of each of the long frogs to the head of the switch rails; drive a spike or stake on the place to be occupied by the gauge sides (inner side) of the switch rail, when thrown on the turnout; now curve the line by setting spikes or stakes, so as to give it a true curve, and so as to give an easy passage through the frog. Perform the same operation with the other side, and the point of intersection of the two lines will be the proper place for the point of the centre frog. It is well to place the centre frog nicely in the position indicated by the crossing of the line; then move it slightly, say ⅛ or ¼ of an inch toward the long frogs; otherwise it may be difficult to line both turnouts so that the point of the centre frog will not be too prominent on one or the other of the side tracks, which would be likely to cause the flanges of wheels to hit the point and cause mischief; but by giving it the slight move toward the long frogs, it will insure a free passage of flanges on both tracks. The above hints are on the supposition that the main track has been laid previous to commencing to lay the turnouts. When the main track and turnouts are all to be laid at once, other lines may be drawn to represent the rails of the track; then proceed as above. More care is necessary in placing cast frogs than the rail frogs, as the latter can be made to yield somewhat, in lining up, so as to conform to the different tracks; while the cast frogs require to be very nicely adjusted at first, or they are sure to cause trouble in lining.

It is frequently necessary for two turn-outs to leave the main track from the same side and from the same switch, and perhaps another from the opposite side, from the same switch. It will require six frogs to do this, and the first thing to be done is to determine the location of the switch and also that of the frogs to be placed in the main track. The location of the intermediate frogs can then be ascertained by drawing lines to represent the rails in each of the turn-outs. It requires a practical eye to draw these lines nicely, and this is the most difficult operation connected with laying turn-outs. Printed rules and instructions are of little use to the tracklayer in performing this operation. He must rely mainly on his own judgment and experience for success in the undertaking. This is obvious from the fact that there is often a lack of room, especially at stations in large towns, or where the company is obliged to make use of every inch of ground in their possession, making it necessary to crowd a good deal of track into a small space, which could not be done if any given rule were adhered to; or, at some points, the turn-outs leave the main track on straight line of the latter, while at other points there is a slight curve, and at others a sharp curve; and sometimes the turn-out leaves the main track from the inside of the curve, and sometimes from the outside. It will thus be seen that the "situation" is frequently changed, and that no two turn-outs are laid precisely alike, except on straight line and with plenty of room.

Next in importance to the proper location of frogs is the curving of iron. This should be nicely done on all curves (as stated in a previous article), but it is especially important that it be well done among frogs. The amount of curve the iron should receive can be readily ascertained at the time the lines are drawn for placing the frogs. When this has been carefully done, take a small line and hold it carefully up to the line above mentioned at the points to be occupied as joints, and while it is held in this way, measure with a rule, at the middle of the small line, the distance the lines are apart; also measure midway between the middle and the end of the line. The distance the lines are apart is the amount the iron is to be curved. This may be more conveniently done by using, in place of the rule, a small stick with notches cut at the points of measurement, used as a gauge for curving the iron. This is a very convenient and accurate way to get the curve. Of course the small line must be held to the other on the side that represents the flange side of the rail, and should be drawn taut.

The guard rail, placed opposite the frog, is frequently too short, and the bend at the ends too abrupt. When guard rails are made of a piece of common track rail, they should be of good length, and the bend much further from the end than is usual. A short guard rail, with the ends bent at nearly right angles, is an abomination. It is impossible to keep it in place, as it is hacked and gouged by the flanges of wheels coming in contact with the ends and cutting out chunks of iron, and the fastenings (which are always of a substantial character) soon give way, resulting in more or less damage.

Placing a guard rail properly is a much nicer operation than is generally supposed. It is amusing to see a man in spiking a guard rail use his hammer to measure the distance the guard is to be from the main rail. If he can drop his hammer in lengthwise between the main rail and the guard, it is supposed to be right, no matter what the size of the hammer. Notwithstanding the variation in the size of spiking hammers, it is an old rule, still adhered to by a great many, to place the guard rail just the width of the hammer at the eye from the main rail. It is the practice with others to place the guard rail just two inches from the main track in all cases. This is a little better than the "hammer rule," and if the track is in true gauge, will do very well; but it is well known that a track that has been in use for a considerable time is often from ¼ to ½ an inch wide gauge; and if the guard rail is placed by the latter rule, it is obvious that it will be just as much too far from the frog as the track is too wide. This will pull the flange of the opposite wheel against the guard of the frog with a succession of sudden shocks, as each wheel passes, soon knocking the frog loose on one side and the guard rail on the other, and at the same time, shaking the bolts out of rolling stock, thereby adding considerably to the expense of repairs.

To place a guard rail correctly it is a good plan to measure two inches from the end of the gauge and make a mark there. Then place the opposite end of the gauge at the point of the frog, and spike the guard rail to this mark, always measuring from the point of the frog and not from the guard rail opposite. This will answer as a general rule, yet there are some peculiar cases where it would not be exactly the thing; but if there is anything wrong in this matter, its cause may be ascertained by watching closely as trains are passing slowly over the frog. Sometimes the flangeway of frogs contains large quantities of chips and shavings that have been cut from the locomotive flanges while passing through the frog. This indicates something wrong, and it should be attended to at once. The cause can easily be discovered by close examination, and if attended to in season may prevent accident.

Tie rods on switch rails should be secured in place by bolting them to the flange or base of the rail. They are usually made to clasp the rail loosely and are driven on from the ends of the rails and left at that. In a short time they become loose and rattle and clatter in a disagreeable manner as trains are passing over them. They soon slip out of place, leaving a long portion of the switch rails with nothing to prevent spreading, which sometimes happens, and the result is by no means pleasant to train hands or track men, and is very unprofitable to the company.

And so we might continue to point out the common faults in the every day practice of tracklayers; but we have called attention to the more important points generally overlooked by them, and also by stockholders and directors, who, above all others, are interested in the matter. It is now thirty-nine years, (we may say forty) since we commenced building railroads in this country, and in that time we have built and put in operation upward of 50,000 miles of road. Some of these roads are a credit to the builders and to the country, yet we are forced to admit, (reluctantly however) that our roads are not, as a whole, as substantially built as they are abroad. The main excuse for this is the want of capital. It is, however, a false economy to build railroads in this shiftless manner, and undertake to keep them open for traffic. The expense of maintaining the permanent way in this country, as compared to that in foreign countries, is ample proof of this. It would seem that our railway men as a class (to use a common expression) "fell into a groove" years ago, in regard to certain practices, and the majority of them are there yet. A few, however, have left it to their advantage, and to the advantage of the public; and present indications are that we are on the eve of a general reform in the construction and maintaining of railways throughout the country. With a view to aid as much as possible in this reform, I will, in a future article, offer hints on matters of importance connected with ballasting, track repairs, etc.

## THE IRON MOUNTAIN RAILROAD.

IRONTON, MO., May 3, 1870.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Thinking a few items from this section might interest you, I have decided to give a few facts in regard to the Iron Mountain Railroad—its present position and future prospects. The present terminus of road is Pilot Knob, 86½ miles south of St. Louis. The principal business of the road is conveying iron ore from Iron Mountain, Pilot Knob, and other stations of less note. The Belmont Branch has a considerable through freight and passenger business between St. Louis and the South. This business would be much greater but for the control which the Illinois Central exercises over the Southern railroads, thereby preventing them from prorating or connecting with the Iron Mountain on the same terms as with the Illinois Central. It is to remedy this evil and give the road a more perfect control of the Southern trade that the management of the Iron Mountain Railroad is preparing to push the line through to Helena, Arkansas. The engineers are now locating the line southward from Pilot Knob to the Arkansas line, and a large force will be put to work on it in a few days. From Pilot Knob south to the Arkansas line the road will run through a country rich in mineral and pine, and the business derived from these two sources will give the road all the freight it can convey. The line through Arkansas will traverse a rich agricultural and stock-growing country. With all these advantages, I have no hesitation in saying that the road will be one of the best paying lines in the country. I have seen it stated that the Chicago, Alton & St. Louis Railroad was negotiating with the Iron Mountain Company for a connection, and would aid in building the extension. Such a move will be a stroke of policy on the part of the Chicago & Alton Company, and I wonder the managers of that company have not long since taken hold of the matter, as it is the only means by which they can hope to compete successfully with the Illinois Central for the Southern trade. Once completed to the Arkansas line, a branch would instantly be built to Batesville, and ultimately to Little Rock. Your readers may form an idea of the present freighting business of the Iron Branch of the road when I tell them that during the month of April just past, the road carried thirty thousand tons of iron ore from Iron Mountain and Pilot Knob to the Mississippi, and but for the scarcity of freight cars the shipments of ore could have been doubled! One hundred new cars are being put on the road, and every effort made to meet the demands of shippers.

T. B. D.

—The Board of Directors of the Cleveland, Columbus, Cincinnati & Indianapolis Railway, at their last meeting, raised the wages of their passenger conductors to $125 per month, and have done away with all the patent "checks" upon conductors' receipts. The object is to place a man in circumstances beyond the necessity of being a rogue—thus cultivating, by the removal of suspicious checks, a high sense of honor and honesty.

—Messrs. Pierson and Fort, the general passenger and ticket agents of the Cleveland, Columbus, Cincinnati & Indianapolis Railroad, have commenced the publication of a paper called the *Weekly Colonist* to be distributed among emigrants from the East to Missouri and Kansas, especially to advocate the merits of their road.

## THE FLEET OF THE FUTURE.

BY J. SCOTT RUSSELL.

[Read before the British Institution of Naval Architects.]

We live in times when revolutions pass so quickly, and carry us to results so little foreseen, that it is necessary to pause from time to time and see whither the race of events is tending, and consider whether our practice and policy in the past will serve us for the future, and whether it may not be wise to modify our plans by the altered circumstances in which we live—in anticipation of this institution ten years ago—and nothing can be more striking than the progress we have made in our ideas, and the revolutions we have gone through in that short time. We were then engaged in discussing this same question, and the great topic was no less than this—whether the fleet of the future should be iron or wood—ironclad or unclad. Who now dreams of returning to wooden men-of-war, to sailing fleets, to three-deckers? And yet no less an authority than Sir Howard Douglas broke many a lance with us ten years ago in a contest about the fleets of the future. These ten years have spoken and pronounced a verdict upon the past. There are few of us left now to argue that a combustible material is the best for the construction of an incombustible fleet. As you were then sagacious enough to take a far-seeing survey of the fleet of the future, which survey I feel satisfied has powerfully aided in giving a right direction to public opinion and public action in the consideration of the fleets of the last ten years, so I think it is wise now to look round and consider what the experience of this last ten years, has taught us, and to look forward and consider the nature of the future ten years, and of the new conditions under which we shall henceforth have to plan and choose and act. Great events have changed the surface of the world in the past ten years. The union of remote continents by submarine telegraphs is a great event. The canal of Suez is a great event. The ocean of India is now steadily, though slowly, flowing into the Mediterranean; the current has been ascertained to be a steady one from the Indian sea into the Mediterranean, and so into the Atlantic. That single barrier removed enables a steamship to sail from New Orleans, from New York, with a cargo of cotton for Marseilles, to unload there, and receive a cargo of manufactured goods for India, China, or Japan, and to continue with a cargo of tea, rice, and other Oriental products from Yokohama to San Francisco, thus performing the trip of 22,000 miles, equal to the circumference of the earth, without let or hindrance. That canal is a new element in the commerce of the world, in the intercourse of nations, in the wars of nations, in the civilization of the human race. The Pacific Railway across America is another great event. It makes the Americans masters of two sea coasts, gives them the commerce of two seas, and to us it opens up a short cut round the world. What events have we to meet in the next ten years? It is not hard to tell. Ten years more will cover the bottom of every sea with lines of electric telegraph. Ten years more will see the Isthmus of Panama cut through, and the Atlantic and Pacific Oceans made one. Right through the Suez Canal, all across the Indian Ocean, straight across the Pacific, home across the Atlantic; by this new canal a large steamship will be able to circulate freely round the world. I have here a plan of the canal to which I last referred, as now sanctioned by the American Government and largely contributed to by the United States. It is to be made through the narrow part of the Isthmus of Darien, with a beautiful harbour at each end which nature has given. It is the same length as the canal through the Isthmus of Suez, namely, 160 kilometres, or 100 English miles; but there is this difference that half of it is already made by nature. When I said ten years I took a little margin. I have so great an esteem for the capacity of the "younger English" in getting through with things when they take them in hand, that I have a notion that they will fetch over such a big cargo of Chinamen that the canal will be opened in five years. Railways are rapidly stretching across the continent of Europe. Russia is pushing on her railways eastward towards the Isthmus of Suez to the Black Sea, to the Caucasus, to the Caspian. From Austria this line will be opened in five years on to Constantinople; it cannot stop there, but must go on across the Bosphorus and right down the centre of Asia Minor to Bagdad, and then along the coast to the Indus, where it will join our Indian railways. Our European railway will be prolonged until English, French, German, Turkish, and Indian railways are all united in one continuous bond of human intercourse. China later, probably, will have railways. Africa, even, and Australia will feed the trade of their harbors by railways. Who shall predict the effect of all this going of things to and fro? It is our business here merely to see what effect all these things will have upon us, on our brethren, on our duties, on our skill, on our country, on our commerce, on our manufactures, on our ships. What, in short, will be the ships of the future? The fleets of the future will plainly have to be constructed in conformity with this work of the future; the changed circumstances of commerce and navigation will help us to decide the duties and define the construction of this our mercantile fleet. Then the nature and the duties of our mercantile fleet, when we have considered them, will help us to decide the construction and armament of that fleet of men-of-war which has its chief duty in protecting our merchant fleets and the commerce which feeds them. First I will examine the nature of the merchant fleets of the future. Nothing in the progress of commerce is more striking than the effect of railways upon ships. Railways and ships help each other, and railways and ships harm each other; railways tend to kill all the smaller and slower class of ships; railways help to load ships expeditiously, they supply large cargoes punctually and quickly. They favor large ships, punctual quick ships. They deprive small ships of cargoes; they do the trade of distribution inland without the help of coasting vessels. Ports are still served by ships, but inland railways serve the places that ports formerly served. Distributing is no longer done by coasters; railways have killed coasting sailing ships; they have not yet quite killed coasting steamers, nevertheless they are very formidable rivals. As railways are made and multiplied, they inevitably run a severe race against coasting steamers; they take away their passengers, and inland they take away their customers. This effect will go on increasing, and they will take away the cream of the local coasting trade all round Europe, so that what remains will not be worth having. The future commerce by ships, therefore, lies not in small ships and local trade, but in large ships and long voyages, in commerce between continents. Modern commerce flows more and more every day into large centres; modern transactions become larger and larger; what is wanted is to be done at once, punctually, in bulk out of hand; quick delivery is absolutely indispensable, and, therefore, large steamships alone can do it. Hamburg, Havre, Marseilles, Trieste, Liverpool, Glasgow, Boston, New York, Calcutta, Yokohama, San Francisco, Melbourne, Sydney, are the centres of modern commerce and modern shipping, and the fleets of the future have, as their great duty, to do the work of carrying the products of different countries between these great centres, and we have to fit these ships for this particular kind of work. To do the work of this enlarged changed world after 1870, we want a new merchant steam fleet. Its size must be proportioned to the length or stages of its voyages. Its power must be proportioned to the special nature of its work, and its speed is a mere matter of finance. The round voyage of the world is as follows: England to Suez, 3,000 miles; England to Bombay, 6,000 miles; England to Calcutta, 7,500 miles; England to Hong Kong, 10,000 miles. Shall we turn back, that is, another 10,000 miles, or shall we go on? From Hong Kong to Yokohama is 1,500 miles; Hong Kong to San Francisco, 6,000 miles; Hong Kong to the Istfmus of Darien, 8,500 miles; from Hong home, 12,500 miles. Thus a voyage of 22,500 nautical miles is the round voyage of the future. Now, I venture to say that the smallest merchant ship for this work is a ship of 3,000 tons nominal. According to the structure of this vessel we can make her with a displacement of 5,000 or 6,000 tons, and we can give her an easy bulk for merchandise of 6,000 tons. I think she could be driven ten knots an hour with 300-horse power. I give this as our smallest Oriental trader. Let me next inform you that such a vessel can comfortably go through the canal of Suez on a low draught of water. I have talked the matter over with M. Lesseps, and he assures me that the vessel I am speaking of will easily and comfortably, as long as he lives, cut through the canal. He also assures me that he has no anxiety whatever as to the canal gradually filling up. Foreseeing the difficulty the slope was made extremely small, but they have taken the precaution of keeping no fewer than twelve of their magnificent dredging machines in stock in case of any such difficulty arising. Now, with regard to the engines and the fuel of these ships, I think that 300-horse power of our modern engines, would propel a vessel such as I have mentioned, without over working, ten knots an hour; but I would suggest a great reserve power. We now, I think, make our engines and boilers too small, we work them to the extent of their power, and we cannot make head against a contrary wind, in which case a steamship is in more danger than a sailing vessel. If you take a larger engine and a larger boiler than you want you will require a little more outlay at first, but you will get a more economical mode of working, and you have the advantage of a great reserve behind. Then with very good engines and boilers, according to our modern plans, the vessel will cousume a ton of coal an hour—that is, a ton for ten knots. A voyage of 5,000 miles would require 500 tons of coal. The engines and boiler cannot weigh less than 300 tons. The voyage of 7,500 miles will require 750 tons; and the voyage of 10,000 miles 1,000 tons. Let me here mention that at Yokohama we are in the coal region, and in the course of the next ten years you will be able to coal all your ships there; that will be our half-way house. For the 1,500 miles trip 150 tons of coal will be required; for the trip to San Francisco, 6,000 miles, 600 tons; to the Isthmus of Darien, 8,500 miles, 850 tons; and for the trip home, 12,500 miles, 1,250 tons. In the voyage to Bombay and home the ship will carry 1,500 tons dead weight of engines and coals, and have room for 2,400 tons of cargo. For Calcatta and home she will carry 2,900 tons dead weight, and have room for 2,100 tons of cargo. For Hong Kong, 3,400 tons dead weight, and only 1,600 tons cargo. But she will have this advantage—that on the home voyage, for the 6,000 miles voyage, she will have only 900 tons dead weight and will have room for 3,000 tons of cargo; for the 7,000 miles home voyage, 1,000 tons dead weight, and room for 2,850 tons cargo; and for the 10,000 miles 2,400 tons dead weight, and room for 2,600 tons cargo. Calculating the expense, &c., of the ship I arrived at the following conclusion: 1. That this is the minimum ship and the minimum power; 2. That she can go and return comfortably through the canal of Suez; 3. That she can bring home and take out cargoes at existing freights, and leave a very good margin. Next we have to consider what sort of ship is wanted for a ship of war, to protect this class of merchant ships. It is perfectly plain that our future ship of war must go through the canal of Suez, and she must therefore, draw not more than 25 feet of water. The canal will admit, as a matter of possibility, vessels of that draught, but not as a matter of convenience, and I do not think that one ship of war should draw more than 22 feet. In the next place, I think you will agree with me that the ships of war that are to attend and protect our merchant fleet must be of a larger size, and they must be very much larger for two reasons. They must carry coal for a long voyage, and to be of any value they must go with great speed. They must carry coal for a longer voyage than the ships they accompany, and they must go much faster. The next point in the construction of our new fleet of war ships is this; are they to be built for the purpose of guarding our merahant fleet, or for the purpose of attacking land batteries? The ships that we have now constructed are perfectly capable of attacking land batteries. Iron-plated ships are absolutely necessary for that purpose, and those of the present construction amply suffice. But to accompany and protect the new fleet of the future we must have quite another class of steamships. First, it must be a ship from 5,000 to 7,000 tons nominal; secondly, it must go certainly 15 knots an hour; thirdly, it must be much more manageable and quick in its movements than even the most manageable and quick of those that we have now got. I have taken the opportunity of conversing with all the admirals who are most likely and able to command the fleets to attack us, and I have gone with them thoroughly into this question. I have also had the privilege of conversing with the most distinguished officers who are likely to command our fleets. I will give you the conclusion which many of them will refuse to admit in public, but which I think it is the interest of the British nation thoroughly to know and deeply to weigh. It is agreed by the most able sailors I know that the one weapon to fight with is stem on. Though he will deny it, and say he will not do it, the one intention of every man who is likely to command a fleet is to give the enemy his stem on, and run him down at all risks. May I say that the weapons constructed for this fence are not the weapons best suited for this practical purpose? I therefore earnestly call upon all naval constructors here present to give their minds with the most untiring devotion to the one fence of running down. You will see that other nations have thought of that, and made their preparations for it to a far greater extent than we are doing, or possibly have any notion of doing. Now that leads us to the next question—what guns shall these ships have? and what protection shall the ships have? I think it is not necessary that they should have protected batteries of guns. It is indispensable that the engines, the boilers, the magazines, and all the essential elements of the ship should be thoroughly protected, but I do not think that the gun-deck of such ship requires any but a small protection, because with this new fence the battle of the sea is over in a very few minutes. Consider what a naval engagement must be between two such ships. I see my enemy coming towards me; I either run away or I do not, or I go forward; if I run away, the less that is said about that the better; if I lie still there will be nothing to say, therefore I go to meet my enemy. When we meet, what is the great point between us? Which shall give the other the stem. It is not a question of how many shots I shall fire out of a round turret. When we get close to one another one of us succeeds in running into the other; if not, we both sheer off, and then is the time, only for a moment, when the guns are wanted—not one, or two, or three guns, fired at a long range, but a broadside of the greatest number of guns you can have ready loaded to discharge as you turn. What you want is a broadside of the largest guns you can place on board the ship, thoroughly unprotected, with competent gunners, who, I may say, do not care two straws for the protection you are offering them. That broadside must be discharged in a moment, and the larger mass of shot you can at that critical instant pour into your enemy the better. Then you go away, turn round, and come back again. That is the mode in which a battle must now be fought out. Am I wrong in saying that such a battle requires a totally different weapon from any that we have hitherto had?

### Railroad Steamships.

The following is a summary of a paper read by Vice-Admiral Sir Edward Belcher on the proper form of vessel for transferring trains of cars across British Channel, between England and France. We give it as reported in the London *Mechanics' Magazine*:

"The author pointed out that the difficulty to be overcome in conveying a railway train across the Channel was to design a vessel that would perform this service without being subject to rolling. It would require a structure that should be the type of strength, smooth as the back of a whale, so as to offer the least possible obstruction to the rolling of a wave, and capable of going at twenty knots without vibration: otherwise the fancied immunity from sea-sickness would not be secured. Furthermore, in order to provide for vessels of the enormous dimensions required, money would have to be expended freely in the construction of adequate harbours or piers to receive them. At the present moment he saw many difficulties to be mastered before success could attend any of the plans that had been laid before the public; and he felt satisfied, he said, that a more satisfactory mode of carrying out the project in view would be developed. Sir Edward proceeded to explain the kind of vessel which he thought would be found to answer all purposes, considered in relation to existing harbor facilities. He proposed three dimensions of vessels to meet the different conditions of traffic. The largest would be 400 feet in length, drawing 18 feet of water; the second 250 feet, with a draught of 10 feet; and the third 300 feet, with a draught of 7 feet. The vessel, of which he exhibited a drawing, would be made on the box principle, with a double line of rails on the main deck, over which would be a hurricane deck, with an entire absence of masts, paddles, and everything upon which the wind or the waves could act to produce rolling. The trains would stand in a kind of cabin, the doors of which would correspond with the doors of the carriages, and these ends would be fitted with closing shutters like shop fronts, so that in fine weather passengers would be able to get out of the train and take air and exercise on the deck, while in bad weather they would be as much sheltered as if they were in a cabin. The mode of propulsion which he proposed to adopt was the turbine, with which the vessel would be peculiarly fitted to turn in a seaway. He also described the mode of embarking, and subsequently went into the question of the kind of pier requisite for the service.

—The Senate Commerce Committee has authorized Senator Conkling to propose a bill providing for the tunnels of the East and North rivers. It is said that the corporators are prepared to commence the work as soon as they have the authority.

# General Railroad News.

## OLD AND NEW ROADS.

**Buffalo Creek Railroad.**

This road, which will connect all the railroads entering Buffalo with the harbor and canal, and is intended chiefly to aid in the transfer of heavy freights, especially coal, between the railroads and lake vessels, will be completed in a few weeks. The Buffalo *Commercial Advertiser* describes its route as follows:

"It commences at or near the Pratt and Wadham "Slip, and runs thence between the Blackwell (or City "Ship) Canal, crossing the Hamburgh turnpike a short "distance above the toll bridge; passing over the "Tift "Farms" it crosses the Lake Shore & Michigan Southern "track at a point 2,000 feet south of that company's "bridge, across Buffalo Creek. Branch tracks connect- "ing with the Lake Shore road have been constructed "from different directions. The track of the new road "crosses the creek at a distance of some 2,000 feet east "by south of the Lake Shore road bridge, at which point "a substantial and handsome bridge is in the course of "construction; continuing thence in a straight line to "the crossing of the Erie and Buffalo & Washington "roads, both of which it will intersect. From this point "the road will be continued till it intersects the Central "Railroad track, at or near William street."

**Indiana & Illinois Central.**

The contractors of this road (Indianapolis to Decatur, Ill.) announce that if $80,000 more is not raised for this road between Indianapolis and Rockville before the 25th inst. they will begin work at the Decatur end and progress eastward.

**Chester & Chicago.**

It is proposed to build a railroad with this name from Chester, on the Mississippi, the centre of mines of coal excellent for smelting iron, in a northeasterly direction to some point on the Illinois Central. Centralia is bidding for it. Sparta, Randolph county, was to vote on a proposition to subscribe $75,000 to the road last Tuesday.

**Milwaukee & Rockford.**

This company was organized at Elkhorn, Wis., on the 3d inst. by the election of the following officers: President, John Nazro, of Milwaukee; Vice President, Martin field, of Mukwonago; Secretary, Timothy Mower, of Milwaukee; Treasurer, P. G. Harrington, of Sugar Creek.

**Atlantic & Lake Erie.**

The directors of this road (Toledo to Pomeroy) have let a contract for the construction of a little more than one half of the line from the north line of Athens county to Bucyrus, 117 miles, to Archibald M. Husten & Co.

**Louisville & Nashville.**

The company has received the first instalment of English rails which are to be used in the construction of a second track.

**Michigan Air Line.**

A correspondent writes to us from Three Rivers, dated the 5th inst., that "the first instalment of iron for the "Michigan Air Line Railroad reached here to-day by a "special train of the Michigan Central Railroad cars "and engine *via* Kalamazoo Division of the Lake Shore "& Michigan Southern Railroad, and were received with "a salute of twenty guns by the enthusiastic citizens. "The iron is very heavy and seems to be of excellent "quality. The road-bed for a distance of forty miles is "all ready for the iron, even to the laying of the ties; "and the whole distance from Jackson to Niles is nearly "completed."

**Belvidere & Illinois River.**

Sycamore, De Kalb county, is to vote on the question of granting $60,000 aid to this new project.

**New Roads to Fort Wayne.**

A telegram from Fort Wayne says that the Fort Wayne, Jackson & Saginaw Railroad will be completed within three months, and the Grand Rapids & Indiana Railroad, from Fort Wayne to Sturgis, Mich., by the middle of June. Arrangements have been made for connections at Fort Wayne between the different lines centering there, which are said to be generally satisfactory.

**Cedar Rapids & Marengo.**

A railroad convention was held in Cedar Rapids, Iowa, on the 5th inst., at which committees were appointed to solicit subscriptions in aid of a road about twenty-five miles long to connect the Northwestern and the Rock Island roads between Cedar Rapids and Marengo.

**Ottawa, Oswego & Fox River Valley.**

At the annual meeting on the 2d inst., the old board was re-elected. The following officers were chosen: Hon. Washington Bushnell, of Ottawa, President; John W. Chapman, of Oswego, Vice-President; Ralph Plumb, Treasurer; D. F. Cameron, Secretary. The Ottawa *Republican* of the 5th says: "Two engines have been re- "cently purchased, and tracklaying has been commenced "at Streator northward. All the iron for the road from "Streator to Ottawa is now at the former place, and the "iron for the road from Ottawa to Aurora is purchased "and all to be delivered by July next. Already ties "have been freighted here by canal sufficient to tie the "track from this place to Fox River. The remainder "will go *via* Aurora. The road will be in operation be- "tween this place and Streator possibly by June 1—cer- "tainly by July 1."

**Decatur & East St. Louis.**

The road was finished last week from Decatur to to Palmer thirty-seven miles southwest of Decatur.

**Omaha Railroads.**

The Omaha *Herald* gives as follows the prospects of the Omaha & Northwestern and the Omaha & Southwestern roads, each of which has now about ten miles completed:

"The present season will witness the Northwestern "finished through Washington to the southern boundary "of Burt, and probably to West Point and the Elkhorn "Valley, a distance of more than fifty miles. Forty "miles is already assured by what is equal to an absolute "guarantee. This will give us an operating line to the "Northwest, pouring into Omaha every dollar of the "trade of that rich section of the State. This result "assured, whether a land grant is obtained or not, the "line will be steadily pushed to the Niobrara, a distance "of two hundred miles.

"The Southwestern gives us certain promise of cor- "responding results in the Southwestern interior. Work "on the line is to be instantly resumed, and it will be "promptly extended from the present terminus at Belle- "vue to connection with the Burlington line at Lincoln, "which offers the most liberal facilities for securing it. "This insures in the Southwest, *the present season*, what "we are certain to realize in the Northwest—railroad "connection with a vast area of rich and well settled "sections of the interior."

**Rochester Munda & Pennsylvania.**

This is one of the important projected lines of Pennsylvania. Its route is to be from Mount Morris, N. Y., through Munda, to the Erie Railway and the coal mines of Northwestern Pennsylvania. It will be a continuation of the Genesee Valley road.

Another road to lead from Rochester, through Warsaw, to the Erie Railroad, at Salamanca, and thence southerly to Warren, Pa., is in contemplation.

**Sharpsville, Wheatland, Sharon & Greenfield.**

A Pennsylvania company with this title has been incorporated with a number of gentlemen from the western part of Mercer county as corporators. The capital stock is fixed at $50,000 at $50 a share, with power to increase as much as may be deemed necessary to carry out the full intent of the charter. On the subscription of 500 shares an organization of the company is authorized. The proposed road runs south from Sharpsville through Sharon to Wheatland Furnaces, crossing State street in Sharon at its intersection with Sharpsville street or any more suitable point. The Greenfield branch commences in Sharon and runs up Pine Run to Keel Ridge, and thence to Greenfield.

**Allegan & Holland.**

Work is progressing rapidly. Iron is laid now as far as Bear Creek in the township of Heath and several very lengthy and substantial bridges have been erected. The one over the Rabbit River is 460 feet long and was built by Wm. W. Williams.

**Chicago & Michigan Lake Shore.**

This week the township of Casco refused to donate $10,000 to the road. Columbia township voted $30,000 upon condition that the road is constructed within one mile of the village of Breedsville, which would carry it so far east that the road would hardly touch Saugatuck and South Haven, but run through the townships of Lee, Clyde and Manlius to Holland.

**Boston, Hartford & Erie.**

A majority of the Committee on the subject of State aid to the Boston, Hartford & Erie Railroad reported to the Massachusetts Legislature on the 9th. Their report provides that scrip shall be issued by the Treasurer of the Commonwealth to the amount of $3,500,000, to provide for which their corporation is authorized to issue second mortgage bonds to the amount of $15,000, a majority to be deposited in the State Treasury before the 1st of January next, for which certificates will be issued by the Treasurer, which shall have the same value as stock; and the Treasurer is to hold the stock till the State is relieved of liability on account of its loan. Before the corporation can receive any of this scrip from the Treasurer, there shall be a new election of officers of the Company, and the State shall have a right to vote for eight of the thirteen Directors through the Governor and Council. The report further provides that all the property of the Boston, Hartford & Erie Ferry Extension Company shall be placed under absolute control of the Boston, Hartford & Erie Company, in such manner as shall be satisfactory to the Governor and Council. The report is signed by eight members of the Committee. A minority report, signed by three members differing with the majority, was also presented.

**St. Louis & Cedar Rapids.**

This road is to be completed from Bloomfield to Ottumwa, twenty miles, by the 4th of July. This section will be operated by the North Missouri Company.

**Marietta & Cincinnati.**

We learn from the Philadelphia *Evening Telegraph* that the issue of $3,000,000 of third mortgage bonds is to raise the funds to put its road into a first-class condition for a first-class road—completing the bridge over the Ohio at Parkersburg, shortening the line thence to the Big Hocking, straightening the line through the tunnel on the north side of Athens, etc. The Baltimore & Ohio will make its main line by the way of Parkersburg, instead of Wheeling. The Marietta & Cincinnati Railroad will also lay a track on the bridge which crosses the Muskingum, between Marietta and Harmar, to connect with the Duck Creek road.

**Marietta & Pittsburgh.**

The work of grading is being pushed forward rapidly since spring opened, and the prospect now is that the road-bed will be completed and ready for the superstructure by the 1st of June. General Warner, when at Baltimore, made arrangements for locomotives and cars, to be delivered by the 1st of August.

**Chester & Tamaroa.**

On the 30th ult. Chester voted to take $75,000 stock in this road, which is intended to give the Chester coal mines an outlet to the Illinois Central. It will be about forty miles long.

**Chicago, Danville & Vincennes.**

The company offers first mortgage bonds bearing 7 per cent. gold interest, to the amount of $2,500,000. Of this amount $1,500,000 is offered in London at £155 per $1,000, which, at present gold rates, would be 89⅛ per cent. of their face. At this price the bonds yield about 9½ per cent.

**Lake Superior & Mississippi.**

The St. Paul *Pioneer* says that the iron is now laid some six or eight miles beyond Kettle River, or a little over 100 miles from St. Paul. Trains will commence running regularly to Kettle River station, 95 miles from St. Paul, in a few days. The grading between Kettle River and St. Louis River is nearly all done. At the other end of the road, from Duluth down to St. Louis River, a distance of twenty-four miles, the greater part of the grading is done, and some eight miles of iron laid. The engineer in charge of that division of the road says it will be ready for trains by the 4th of July. They have some 2,200 men at work, and every exertion will be made to complete the road by the time specified, when it wil be opened by a grand excursion from St. Paul to Duluth

**Fredericksburg & Charlottesville.**

This road is to make connection between the Chesapeake & Ohio at or near Charlottesville and a branch of the Pennsylvania Railroad, which will soon extend from Baltimore to Belle Plain, near Acquia Creeek, called the Baltimore & Potomac Railroad. It is said that the Pennsylvania Company will also build a railroad from Fredricksburg to Washington. It is also reported that it has obtained control of the Richmond & Fredricksburg Railroad and is forming connections further south.

**Washington & Ohio.**

This is the name of the Virginia Railroad formerly known as the Alexandria, London & Hampshire. Engineers are now surveying a route for a proposed extension to Pomeroy on the Ohio river.

**Southern Minnesota.**

Workmen commenced at Ramsey this week and will work east to fill up the gap between there and Lanesboro. Several hundred hands have been at work all winter on the Lanesboro end. Mr. Wyckoff, Assistant General Manager, assures the Wells *Atlas* that the road will be completed in time to move the crops this fall.

**Minnesota Western.**

The Supervisors of the town of Chaska have voted unanimously in favor of issuing bonds to the amount of $10,000 in aid of the construction of the Minnesota Western Railway. The election to ratify this action of the supervisors takes place to-day. The company have not yet determined the point at which they will cross the Minnesota river. The engineers will locate permanently the line between Minneapolis and the river by the 20th of May, preparatory to letting the contract for construction.

**Cincinnati, Hamilton & Dayton.**

Just after the Lake Shore election the newly elected officers made a trip to Cincinnati. Only a day or two afterwards Jay Gould arrived. A telegram dated the 7th inst., speculates as follows on the causes of the visit: "His presence so soon after that of the New York Cen- "tral party has created some anxiety concerning the "cause. It is reported to-day that the representatives of "the New York Central were here and endeavoring to

"make terms with the Cincinnati, Hamilton & Dayton "Railroad for a more intimate business connection with "that road, on account of some disturbance of the rela- "tions of the Central with the Little Miami road. Ru- "mor further says that Jay Gould is here to prevent any "arrangement with the Cincinnati, Hamilton & Dayton "road, and that he threatens to build a road from Cin- "cinnati to Dayton if his wishes are not gratified. "Whether this is true or not, there is doubtless some- "thing important in the wind. The impression is gain- "ing ground that the three great roads will not always "be content with two routes into Cincinnati."

**Kansas, Indian Territory & Gulf.**

Mr. Williams reported to the Senate with amendments, the bill to incorporate the Kansas, Indian Territory & Gulf Railroad Company; to enable the Missouri River, Fort Scott & Gulf Railroad, and the Leavenworth, Lawrence & Galveston Railroad Company to construct a single railroad track through the Indian Territory to the Gulf.

**The Concord and Northern New Hampshire Roads.**

A contract has been made for operating these roads under one management for five years, the Manager to be chosen by both boards of directors. The Concord Company is to receive no more than ten per cent. on its capital stock, if it can earn more the rates are to be reduced. The Concord road proper extends from Concord southward to Nashua, 35 miles, with a branch seven miles long. But in addition it leases the Concord & Portsmouth Railroad, 58 miles long. The Northern Railroad extends from Concord northwestward to West Lebanon, opposite White River Junction, where it connects with the Vermont Central and the Connecticut & Passumpsic roads. Its length is 69 miles with a branch 13½ miles long. The two roads now operated together form a line from West Lebanon to Manchester, with two forks thence, one to Portsmouth and one to Nashua. The distance from Portsmouth to West Lebanon is 127 miles; from Nashua, 104 miles. The Boston & Lowell road connects with it at Nashua for Boston.

Under the new arrangement ex-Governor Onslow Stearns has been chosen Manager.

**Northern Pacific.**

J. Gregory Smith, President of the company, has issued a circular asking for bids for the grading, masonry, bridging and ballasting of that portion of the road extending from the Dalles of the St. Louis River to the Red River, the western boundary of Minnesota, (a distance of about 230 miles,) including everything requisite to complete the road-bed for a single track, and necessary side tracks, ready to receive the rail superstructure.

The company will also receive proposals for the timber cross-ties, and for the iron rails, spikes, and fixtures for the road as above. The proposals are receivable up to the 1st of June.

We learn from the St. Paul *Press* that a company has just been formed in New York called the Superior & Puget's Sound Company, which is to operate in lands along the route of the Northern Pacific, after the manner of the Western Land Company on the Superior line.

**Michigan Upper Peninsula Railroads.**

The Houghton (L. S.) *Mining Journal* of the 5th says: "The report that the Michigan Central Railroad Com- "pany have got possession of the Marquette & Ontona- "gon Railroad grant, and will construct the road during "the life of the grant, is revived again. There is a bare "possibility that such will be the case, but, if it is done, "they have got to work lively, as the grant expires, we "believe, July 1, 1871. The Chicago & Northwestern "Company have fully decided to extend their road sixty "miles, from Green Bay to Marrinette (Menominee), "this season, leaving only sixty miles more to connect "with their Peninsular Division, extending about eighty "miles westward from Escanaba. A private letter states "that it is quite probable that at least twenty miles of "railroad will, this season, be constructed, leading out "from Bayfield, but in what direction is not stated."

**Indianapolis, Bloomington & Western.**

The last rails were laid and the last spike driven on this line on Sunday, the 1st instant, amid general glorification.

**Toledo, Peoria & Warsaw.**

The Galesburg *Register* says: "The company are mak- "ing arrangements to run a through train eastward from "Peoria, in connection with trains on the Chicago, "Columbus & Indiana Central Railway. By this way "close connections will be made, the time between "Peoria and New York being about forty-two hours. "Pullman sleeping cars will be attached to the trains."

**Union Pacific.**

The Council Bluffs *Nonpareil* says that this compnny is building a depot on the east side of the Missouri, near the bank, where most of their business will be done until the bridge is built. "Then," it adds, "we expect to see "the finest passenger depot erected here that the world "can boast of; at least, such is the assurance given us by "all the principal officers of that corporation, and we have "every reason to believe that they are gentlemen who "will redeem every promise they have made." A road which has travel for but one passenger train a day—hardly one-half as much as any road entering Chicago—can hardly have use for the finest passenger depot in the world; though it might be very fine, without being very large. The Union Pacific is a great road, but as yet it does not do a great business.

**Council Bluffs & Omaha Transfer.**

The contract has been let for grading the track of the Union Pacific from the Union Depot in Council Bluffs to the bridge. Of the working of the new arrangement the Council Bluffs *Nonpareil* says: "In accordance with "the arrangements made, on Sunday morning the trains, "instead of stopping as usual at the old temporary de- "pots at the river, run directly down to the river bank, "where the passengers went on board the H. C. Nutt, "which was in readiness to receive them. On the west "side, where they disembarked, they found the Union "Pacific cars ready for them, in which they were quickly "seated, The time occupied in the transfer was probably "thirty minutes, and all the passengers, many of whom "had often crossed on the old transfer line, seemed "highly delighted with the change."

**Missouri Valley.**

It is reported again that this road will be consolidated with the St. Joseph & Council Bluffs Railroad, and that the name of the consolidated line will be the Kansas City, St. Joseph & Omaha Railroad. Three shares of Missouri Valley stock to one of St. Joseph & Council Bluffs is given as the basis of consolidation.

**Decatur, Ill., to Mt. Vernon, Ind.**

The Mt. Vernon, Grayville & Mattoon, and the Decatur, Sullivan & Mattoon Railroad companies have contracted for the building of their lines. The Mt. Vernon, Grayville & Mattoon Railroad is to be completed from the Ohio river to Mattoon in three years from June 1, 1870; the Decatur, Sullivan & Mattoon Railroad by June 1, 1872. The work will be commenced at Mattoon this spring.

**Erie & Pittsburgh.**

The Pennsylvania Railroad Company took possession of this line under its lease on the 2d inst.

**Madisonville & Shawneetown.**

This company was to be organized at Madisonville, Ky., on the 11th inst., for the purpose of constructing a railroad from a point opposite Shawneetown, Ill., southeastward about forty miles to Madisonville, where it will connect with the Evansville, Henderson & Nashville line for Nashville and the South.. At Shawneetown it would connect with the Springfield & Illinois Southeastern for Chicago and the Northwest, with the St. Louis & Southeastern for St. Louis and the West.

**Springfield & Illinois Southeastern.**

The road is completed from Flora on the Ohio & Mississippi southward to Fairfield, twenty-five miles and north to Louisville, eight miles. About twelve miles more, from Louisville northwest to Edgewood, will give it a connection with the Illinois Central and Chicago.

**Rockford, Rock Island & St. Louis.**

The first through train from Beardstown to St. Louis over the Rockford, Rock Island & St. Louis Railroad arrived in St. Louis on the 9th inst., bringing an excursion party of about three hundred from towns along the line. The distance is 110 miles, twenty miles of which is over the Indianapolis & St. Louis road. The chief towns on the line are Beardstown, Chapin (Toledo, Wabash & Western crossing), Winchester, Whitefield, (St. Louis, Jacksonville & Chicago crossing), Greenfield & Brighton, (Chicago & Alton crossing.

**Arkansas Railroads.**

A correspondent writes from Little Rock, Ark., "You "were led into a mistake in your quotation from the Mem- "phis *Avalanche*, as there is and has been a small force "at work on the Memphis & Little Rock Railroad be- "tween the White and Mississippi rivers, which they are "about to increase. (Give the Devil his due.) The Lit- "tle Rock & Fort Smith Company are crowding their "road; have two engines and thirty cars. The Cairo & "Fulton claims to be letting work."

**Iowa, Missouri & Nebraska.**

Articles of consolidation of the Iowa Southern and the Alexandria and Nebraska companies under the above name were filed in the office of the Secretary of State of Iowa on the 10th inst.

**Manitowoc, Appleton & New London.**

Appleton has voted $100,000 in aid of this road. Contracts have been let for building the road from Manitowoc to Appleton.

**Madison & Portage City.**

James Campbell, the President, telegraphed from New York on the 10th, that he had closed a contract for iron sufficient to iron the road between Madison and Portage City. Mr. Campbell had been in New York for three or four weeks for the purpose of negotiating the bonds of the company, and it seems he has effected a sale.

## ELECTIONS AND APPOINTMENTS.

—E. I. Burritt, for many years, the New York representative of the North Missouri Railroad, has been appointed General Eastern Agent of the Toledo, Wabash & Western Railway, with headquarters at No 526 Broadway.

—Seth Frink, formerly connected with the Cincinnati, Hamilton & Dayton Railroad, has been appointed General Freight Agent of the Iron Mountain Railroad, succeeding Edward Harding, who has been made Assistant Superintendent.

—A. Pope, formerly of the Montgomery & West Point Railroad, has been appointed General Freight Agent of the Western & Atlantic Railroad.

—At the meeting of stockholders of the Cairo & Fulton Railroad Company in Little Rock, on the 2d inst., the following were elected directors: M. L. Rice, J. Hodges, F. M. Chrisman, James Coats, for three years; R. F. Catterson, W. W. Leverett, M. W. Benjamin, and J. M. Lewis, for two years; Logan H. Roots, A. McDonald, J. Brooks, and Henry Page, for one year. M. L. Rice was chosen President.

—The New York Canal Board made the following appointments for Buffalo last week: George Talbot, Collector; John Rodney and —— Krull, Inspectors; Frank Gallagher, Superintendent.

—M. M. Patterson has been appointed night Train Despatcher at Rawlins for the Laramie Division of the Union Pacific Railroad.

—The following gentlemen have been elected Directors of the projected Androscoggin Valley Railroad Company: A. D. Lockwood and J. B. Ham, of Lewiston; E. F. Packard, of Auburn; Lee Strickland, of Livermore; Philo Clark, of Turner; Thomas J. Cox, of Dixfield. The office of the company is at Lewiston, Me.

—John Given, late General Freight and Ticket Agent of the Des Moines Valley Railroad, has been appointed General Superintendent, in place of Milo Smith, resigned.

—C. A Wortendyke has been chosen President, J. P. Putnam Vice President, and H. R. Low Treasurer of the newly organized New Jersey Midland Railroad Company.

## TRAFFIC AND EARNINGS.

—The earnings of the Morris Canal & Banking Company for the fiscal year ending February 28, 1870, were $431,245.80, and the disbursements $246,397.09. The canal extends from Philipsburg, N. J., to Jersey City and is 102 miles long. Its chief business is carrying coal.

—The South Carolina Railroad Company operates 243 miles of road, the main line of 137 miles from Charleston to Harrisburg (opposite Augusta, Ga.), a branch of 68 miles from Branchville to Columbia and one of 38 miles from Kingsville to Camden.

The earnings of this road for the years ending December 31, 1868 and 1869, were as follows:

| | 1868. | 1869. |
|---|---|---|
| From Passengers | $310,778 47 | $325,180 85 |
| " freight | 961,704 30 | 1,009,067 40 |
| " mail | 20,575 00 | 20,088 46 |
| " other sources | 1,904 12 | 17,830 29 |
| | $1,294,961 89 | $1,382,167 00 |
| Expenses, viz: | | |
| Bureau Department | $15,430 23 | $15,379 69 |
| Transportation | 358,392 87 | 394,859 55 |
| Machinery | 167,673 03 | 176,294 80 |
| Roadway | 155,952 17 | 147,892 49 |
| | $697,447 40 | $734,425 53 |
| Earnings less Expenses | $597,514 49 | $647,741 47 |

Compared with the previous year the gross earnings of 1869 show an increase of $87,205.11; with an increase in expenses of $36,978.13—making the increase of net earnings, $50,226.98. The net income, after payment of interest, damages etc., shows a decrease of $25,704.11.

—The Toledo, Wabash & Western Railway (Toledo, O., to Quincy, Ill., and Keokuk, Iowa), 522 miles long, earned in the year 1869 $4,252,342.81, while the expenses were $3,051,404.58. The increase over the earnings of the previous year was $239,134.83. The traffic in grain on the line has increased largely. In 1869 it carried 3,499,680 bushels of corn, 2,211,205 of wheat, and 842,930 of oats.

—The earnings of the Charlotte, Columbia & Augusta Railroad (105 miles long) in the year 1869 were $403,785.49, and the expenses £226,536.59.

—The Northwestern Railroad, of South Carolina, extends from Charleston 102 miles to Florence, where it connects with the Washington & Manchester road: The

earnings of this road for the year ending February 28, 1869 and 1870 were as follows:

| | 1869. | 1870. |
|---|---|---|
| From passengers | $81,303 73 | $87,667 51 |
| " freight | 151,844 89 | 172,465 83 |
| " express | 4,366 86 | 4,337 04 |
| " mails | 13,748 92 | 15,637 45 |
| | $354,164 39 | $380,097 63 |
| Expenses, viz: | | |
| Maintenance of road | $43,701 40 | $40,899 05 |
| Motive power | 38,794 73 | 32,118 65 |
| Repairs of cars | 14,763 08 | 16,535 99 |
| Transportation | 35,313 00 | 54,590 08 |
| Salaries and general expenses | 14,868 88 | 14,986 53 |
| | $145,439 09 | $159,560 23 |
| Net earnings | $108,725 30 | $120,537 40 |
| Total balance on hand | | $45,663 37 |

Compared with the previous year, the gross earnings show an increase of $25,933.24; with an increase in operating expenses of $14,121.14—making the increase in net earnings, $11,812.10.

—The Greenfield & Columbia Railroad extends from Columbia, S. C., northwest 143 miles to Greenville with branches 21 miles long. The receipts from operations of this road for the year ending September 30, 1869, were:

| | | |
|---|---|---|
| From passengers | | $114,196 61 |
| " freight | | 274,506 89 |
| " mails | | 11,400 00 |
| | | $400,103 50 |
| Expenditures: | | |
| Operating expenses | $247,686 52 | |
| New Iron | 17,924 21 | |
| | | 265,610 73 |
| Net earnings | | $134,492 77 |

The road and outfit, including real estate, cost $3,081,213.50. The total amount of capital stock paid up is $1,510,374.54.

## MECHANICS AND ENGINEERING.

### The St. Louis Bridge.

The filling with concrete of the caisson under the west pier of the bridge was completed on the 7th inst., and the pier now stands solidly on the bed-rock of the river. The shafts and air locks leading to the air chamber will also be filled. The river having fallen sufficiently, work was resumed on the east pier last Monday, and, during the week, the eastern shore abutment was commenced.

### Ohio River Bridges.

John W. Garrett, President of the Baltimore & Ohio Railroad, states the suspension bridges at Wheeling and Benwood, on the Ohio river, intended to connect that road with the Pan Handle Route, as well as the one at Parkersburg, connecting the Marietta & Cincinnati, will be completed as soon as possible. The latter, it is expected, will be ready by the first of November next.

### Tennessee River Bridge.

The railroad bridge over the Tennessee river at Florence, Ala., a few miles north of Tuscumbia, was completed Saturday, the 20th ult. A thorough test of the structure was made with eight or nine locomotives and several loaded cars, the result being pronounced entirely satisfactory. The bridge has two roadways, the upper one for the passage of trains and the lower for ordinary vehicles. Its total cost was about $120,000.

## LOCO MOTIVE STATISTICS.

### Illinois Central.

The report of S. J. Hayes, Superintendent of Machinery of the Illinois Central Railroad, for the year ending December 31st, 1869, affords the following:

The number of miles run by trains was as follows:

| | |
|---|---|
| Passenger trains | 1,235,450 |
| Freight " | 3,437,072 |
| Construction " | 154,485 |
| Switching " | 597,316 |
| Total | 5,414,308 |

The cost per mile run was

| | |
|---|---|
| For oil and waste | .73 cts. |
| " fuel | 6.56 " |
| " engineers and firemen | 5.88 " |
| " cleaning | 1.07 " |
| " repairs | 11.27 " |
| Total | 25.51 cts. |

Cost per mile run, in cents:

| | |
|---|---|
| Passenger engines | 23.11 cts. |
| Freight " | 25.83 " |
| Construction " | 24.10 " |
| Switching " | 13.50 " |
| Average cost per mile for each car hauled | 2.03 " |

Average number of miles run to

| | |
|---|---|
| Pint of oil | 14.37 |
| Ton of coal | 37.04 |

The above oil includes that used in headlights and in lamps of engineers. Wood is rated at $5.813 per cord, in Illinois and at $9.602 on Iowa Division; coal at $2.109 per ton, in Illinois and at $3.288 on Iowa Division; oil, 60c. per gallon; waste, 15c. per pound. Re-building, superintending, teaming and all other expenditures appertaining to repairs are included in the above cost of performance of locomotives.

The whole number of locomotives owned by the company is 177, all but two coal burners. The length of the road operated is 939 miles. 93 have had thorough or general repairs, and 12 have been rebuilt during the year.

## REGISTER OF EARNINGS.

FOR THE THIRD WEEK OF APRIL.

| | | |
|---|---|---|
| St. Louis & Iron Mountain (210 miles) 1870 | | $27,558 00 |
| " " " (119 " ) 1869 | | 15,817 25 |
| Increase (74¼ per cent) | | $11,740 75 |

FOR THE MONTH OF APRIL.

| | | |
|---|---|---|
| Chicago & Northwestern, (1,157 miles) 1869 | | $1,112,190 16 |
| " " (1,157 " ) 1870 | | 950,636 89 |
| Decrease (14¼ per cent.) | | $161,553 27 |
| Chicago, Rock Island & Pacific (606 miles) 1870 | | $443,309 |
| " " (520 miles) 1869 | | 362,961 |
| Increase (22 per cent.) | | $80,348 |
| North Missouri, 1870 (404 miles) | | $269,490 91 |
| " 1869 (404 " ) | | 149,184 29 |
| Increase (80⅝ per cent) | | $120,305 92 |
| Kansas Pacific (518 miles) 1870 | | $260,000 |
| Illinois Central (965½ miles) 1870 | | $397,571 10 |
| " (895 miles) 1869 | | 368,282 32 |
| Increase (5 1-6 per cent.) | | $29,288 78 |
| Chicago & Alton, (465 miles) 1870 | | $434,653 37 |
| " " (431 miles) 1869 | | 328,390 50 |
| Increase (2 per cent.) | | $6,262 87 |

(The 34 additional miles in 1870 were operated only two weeks of April.)

| | | |
|---|---|---|
| Michigan Central, (329 miles) 1869 | | $412,030 42 |
| " " (329 " ) 1870 | | 411,814 34 |
| Increase | | $216 08 |

FOR THE FIRST WEEK IN MAY.

| | | |
|---|---|---|
| Chicago & Alton (465 miles) 1870 | | $86,600 97 |
| " " (431 " ) 1869 | | 77,642 38 |
| Increase (11¼ per cent.) | | $8,958 59 |

## LOAD-DRAUGHT OF MERCHANT SHIPS.

[Read before the British Institute of Naval Architects by Mr. W. W. Rundell.]

The proper draught for a merchant vessel, said the author, is not a question to be determined in the first place by science, but by experience. Science may lend her aid in defining and generalizing the results of experience, but must unhesitatingly accept the dicta of those whose position and long practice make them the real arbiters of the question. The naval architect and shipbuilder must bow, like others, to the decision of these experts. The load-draught cannot be arbitrarily fixed by the naval architect. Lloyd's rule, three inches to the foot depth of hold, or the scale of the underwriters, may be quoted; but these bind no one. Lloyd's rule was a suggestion only, and it was made when iron ships were just being talked of, and when few ships, except East Indiamen, exceeded 700 or 800 tons, and it has never been recognized by Lloyd's Committee, except as an approximate guide for the loading of certain classes of vessels. The Liverpool scale is only intended for first-class vessels, and is subject in all cases to the judgment of the surveyor, who is influenced by the age and class of the vessel, its general proportions, the intended voyage, the nature of the cargo, and other circumstances favorable or otherwise. The experts who practically rule in these matters are certain surveyors more or less intimately connected with the underwriting bodies, and who, if not practically appointed by shipowners, have secured their confidence. Their great experience enables them to judge very closely as to the draught of water at which a ship begins to damage her cargo or become otherwise unsafe. Wooden vessels are now passing away and iron sailing ships are being largely superseded by steamers. Iron sailing vessels will in future be chiefly employed in long voyages, and new ones will probably be of large size. As regards iron vessels, therefore, considerations depending on their age, the nature of the voyage, the season of the year, as affecting their load-draught, may be omitted nearly altogether. Considerations arising from the kind of cargo may also be omitted, as it is generally acknowledged that, with proper care, and by incurring the expense necessary for making good stowage, any proportion of dead weight may be safely carried. There remain only those conditions which relate to form and proportion, and these, I submit, are sufficiently represented by adopting the customs' measurements and registered tonnage. The suggestion that 3-10ths of the whole displacement is a proper proportion for buoyancy was made years since by Mr. J. Jordan. The author then proceeded to refer to various tables bearing on the subject of his paper; and alluding to the requirement of more free side for large wooden ships than for small ones, he said that the reasons assigned for it were not applicable to iron ships. Large iron ships can be as strongly built as small ones. There can be little objection to the 3-10ths displacement scale for ascertaining when a sufficient quantity of cargo has been placed on board a vessel. But it makes no allowance for extreme length, or for the length and character of the waves which she may encounter. The surveyors state the extreme length in proportion to a vessel's other dimensions, must be considered; but, so far as I am aware, they have not defined to what extent. Like the surveyors, I have not come to any definite opinion on this subject, but wait for better instructions. Like other scales which point out, with more or less exactness, what is the proper load-draught for a vessel, they leave us in ignorance as to what amount of departure from it will render a vessel relatively unsafe or practically unworthy. After some observations as to the desirableness of some mode of ascertaining the point at which a ship becomes dangerously laden, the author concluded by the following practical suggestion: Let a round spot, 9 inches in diameter, be conspicuously painted on every vessel over 300 tons register on each side, midships, at a point through which a horizontal plane would pass which would cut off the upper one-fourth of the vessel's registered tonnage when she is on an even beam. This would be useful in indicating pretty accurately when three-tenths of the whole vessel are out of water. In vessels about 500 tons this mark should be fully its own diameter above water. In vessels of 750 tons it would be one and a-half its own diameter above water. In vessels of 1,500 tons it would be two diameters above water; in larger ships two and a-half diameters. Here no kind of instrument would be required to make the observation. If the spot were very near the surface of the water the ship would certainly be very badly laden; if it touched the water she would be very deeply laden; if immersed or out of sight she would be dangerously laden. This would not hurt the ship-owner in any way. The proposed mark would indicate a fact, not an opinion.

## TUNNELS OF THE PACIFIC RAILROADS.

[Abstract of a Paper read before the American Society of Engineers, Jan. 5, 1870, by John R. Gilliss, Civil Engineer.]

### TUNNELS OF THE UNION PACIFIC RAILROAD.

Tunnel No. 1 is on St. Mary's Creek, about 680 miles miles west from Omaha, and twelve miles east of second crossing of North Platte River. It was commenced April 30, 1868, and continued from each end until June 8. At that time the two headings were in 86 and 87 feet respectively, the progress having averaged 2.22 feet per day. A soft spot was then found in the west end, and there being no means of lining without delay, the open cut was extended to cover the place, and the length of tunnel reduced to 215 feet.

This delayed the work, so that a temporary track had to be built around it.

Tunnel No. 2 is at the head of Echo Canon, in Utah, about 972 miles from Omaha. Its length is 772.3 feet, being the longest of the Union Pacific. The approaches were started in July, 1868; they are heavy cuts through clay. Rock was struck about the end of August, and found to be like the prevailing formation in the vicinity, an indurated clay, with occasional streaks of soft sandstone. Most of it drilled very easily, but required as much powder in blasting as ordinary rock. While damp it stood firm, but after sufficient exposure to the air to dry out the moisture, it cracked and crumbled like lime in slacking. These qualities made the work very expensive; rock prices had to be paid, and earth slopes taken out.

In starting the headings they had to be supported the same day the excavation was made; but on getting fairly in, the roof would stand well a week or two.

There was an irregular streak of blue sandstone which ran completely through the tunnel near the springing line.

The headings were started at the west end, August 29, and at the east end, September 5; they met January 30, 1869. The tunnel was finished April 3, 1869.

When work was commenced on the tunnel, the track was still 300 miles east, and all the available transportation required to haul tools, materials and provisions over this gap; it was useless even to think of getting cement in time. There was no suitable stone near the work, and the clay had too much lime to make brick. On these accounts the tunnel had to be lined with timber.

*Tunnel No. 3.*—This tunnel is through a sharp spur of black limestone and dark blue quartzite, 266 feet of the former and 242 feet of the latter, total length 508 feet, on a 3 deg. 30 min. curve to the left. The headings were commenced about September 1, 1868, and met April 4, 1869. Until December 27th the work was part of Brigham Young's contract, and sublet to Sharp & Young. It was then carried on as company work, and let to Daniel McGee, a "Gentile," February 9th. Not being finished in time for the rails, a temporary track was built around it, partly on a 22 deg. curve, 260 feet radius, around which trains of 23 cars were taken.

Nitro-glycerine was fairly introduced into the tunnel by February 23d. About 20 per cent. of the tunnel men struck on account of its use, and were not replaced, as two shifts on the bottoms were found enough to keep them up with the headings, notwithstanding the additional progress they too were making; three shifts had been required with powder. About twice as much work was done per man with nitro-glycerine as with powder. The use of nitro-glycerine in tunnel No. 3 saved the company nearly $40,000.

*Tunnel No. 4.*—Length 207 feet; alignement 4 deg. to left; material, quartzite, similar to that in tunnel No. 3. Headings were commenced about September 10, 1868, and tunnel finished January 29th; nitro-glycerine was used to take up the last 180 feet of bottom, which it did in 11 days; making the remarkable progress of 8.18 feet per day from each end. In tunnel No. 4, 1,960 cubic yards were taken out with powder, requiring 289 kegs and 7,000 feet of fuse, or 3 7-10 lbs. powder and 3 6-10 feet fuze per cubic yard.

*Comparison between the two roads.*—The total length of tunneling on the Central Pacific is 6,213 feet; on the Union, 1,792. The cross sections of tunnels on the two roads are practically identical.

The circumstances and material varied too much to make an accurate comparison of progress in tunnels of the two roads. The greatest average daily progress of heading on the Central Pacific, through granite with nitro-glycerine, was 3.29 ft. On the Union Pacific, through quartzite, about as hard as granite 4.62 ft. Each road has done over 8 ft. per day at a single face in taking up bottom.

The laborers on the Central Pacific were mostly Chinamen, paid $30 to $35 gold per month, working three shifts per day in tunnels, and 12 to 15 men in a heading. On the Union Pacific the laborers were white men, paid $3 to $4 per day currency, generally working two shifts per day, and 8 to 12 men in a heading, on tunnels 1 and 2, and three shifts of 14 to 16 on tunnels 3 and 4.

The Central Pacific Railroad was built under the direction of S. S. Montague, Chief Engineer. The location and construction across the Sierra Nevada were in charge of L. M. Clements, Resident Engineer. The account of tunnels on that work is principally compiled from a report on the subject written for the latter by the the author, while engaged on tunnels 6 to 13 of that work.

The Union Pacific Railroad was built, and its location revised, under the direction of S. B. Reed, Engineer and Superintendent of Construction. The accounts of tunnels 1 and 2 are from personal observation, and of tunnels 3 and 4 from data furnished by Edward P. North, Resident Engineer of work in Weber Canon.

RAILROAD GAZETTE

PUBLISHED EVERY SATURDAY.

CONTENTS.


| | Page. |
|---|---|
| Self Oiling Journal Bearing | 145 |
| Telegraphic Messages | 145 |
| **CONTRIBUTIONS.** | |
| Engineering, by Benj. H. Latrobe | 145 |
| Railway Management—Its System of Advertising, by Paul Stork | 147 |
| Hints on Tracklaying, by Wm. S. Huntington | 148 |
| The Iron Mountain Railroad | 149 |
| Buffalo Correspondence | 156 |
| **SELECTIONS.** | |
| The Fleet of the Future | 150 |
| Railroad Steamships | 150 |
| Load Draught of Merchant Ships | 153 |
| Tunnels of the Pacific Railroads | 153 |
| Excursion Trains on English Railroads | 156 |
| **GENERAL RAILROAD NEWS.** | |
| Old and New Roads | 151 |
| Elections and Appointments | 152 |
| Traffic and Earnings | 152 |
| Mechanics and Engineering | 153 |
| Locomotive Statistics | 153 |
| Register of Earnings | 153 |
| Conductors' Life Association | 155 |
| **EDITORIALS.** | |
| Minority Representation | 154 |
| The New York Press on the Lake Shore Election | 154 |
| Merrill on R. R. Bridges | 154 |
| Lake Shore Earnings in 1869 | 155 |
| Zerah Colburn | 155 |
| CHICAGO RAILROAD NEWS. | 155 |
| NEW PUBLICATIONS | 155 |


## Editorial Announcements.

*Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

*Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

*Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the* RAILROAD GAZETTE, *if not previously published,* FREE OF CHARGE. *They are invited to send us drawings or models and specifications. When engravings are necessary the inventor is expected to furnish his own engravings or to pay for them.*

☞ *Our Prospectus and Business Notices will be found on the last page.*

## MINORITY REPRESENTATION.

A few weeks ago we urged the propriety of minority representation in boards of directors. We hardly hoped then that what we urged would be provided for by law, at least for several years to come. But the subject has attracted the attention and approval of the Constitutional Convention of this State, and a few days ago it adopted the following section of an article reported by the Committee of the Whole on Miscellaneous Corporations.

SECTION 1. The General Assembly shall provide by law, that in all elections for directors or managers of incorporated companies, every stockholder shall have the right to vote in person, or by proxy, for the number of shares of stock owned by him for as many persons as there are directors or managers to be elected; or to cumulate said shares, and give one candidate as many votes as the number of directors multiplied by his shares of stock shall equal; or to distribute them, on the same principle, among as many candidates as he shall think fit; and such directors or managers shall not be elected in any other manner after the adoption of this constitution.

Let us see how this will work. We will suppose that one party of the stockholders of a company hold five-ninths of the stock. According to the present custom it would elect *all* the directors, and might not only pursue a policy in opposition to the wishes of the other four-ninths, but keep these stockholders absolutely in ignorance of the condition of their property and the use made of it. This is as if, in a firm of five equal partners, three should not only decide all matters connected with the business but never consult with the others and even refuse to let them know how they had determined to carry on the affairs of the firm. But according to this new law the party of four-ninths would agree to support as many directors as their stock would elect. Suppose their stock to amount 40,000 shares, and the number of directors to be thirteen. Each share having thirteen votes, the majority would cast 50,000 × 13 = 650,000 votes, and the minority 40,000 × 13 = 520,000 votes. Evenly divided, each director would receive 90,000 votes. By dividing 420,000 by this number the minority find that they can give that number of votes to four candidates and have a surplus of 60,000 votes. The majority can give that number of votes to seven candidates and have 20,000 votes remaining. If this should be done, the 60,000 surplus of the minority and the 20,000 of the majority would each elect a candidate. But this process is faulty, inasmuch as an even distribution of the votes of one party might secure it more than its share of directors. The true method is for each party to vote for the same proportion of the whole number of directors as its stock is of the whole amount of stock. In the case supposed, that is, the minority should vote for four-ninths of the thirteen directors, which would be, exactly, five and seven-ninths. Of course, then, the majority would have seven and two-ninths. As the minority has the larger fraction, it could elect its sixth candidate against the majority's eighth. That is, it would give to each of six candidates 86,666⅔ votes; while the majority could give to each of eight only 81,250 votes. Knowing this, the majority would probably concentrate on seven candidates, and give each 92,857 1-7 votes. It is evident that the rights of the minority of the stockholders would be much better protected if they had six out of the thirteen directors than if they had none. Of course the majority would control the company's policy and direct its management, as is quite proper, but it would find it hard to take any unfair advantage of men whose representatives were in council with them.

The effect, and the advantage, of this plan of elections will appear in other cases where the minority is less; as, for instance, where a stockholder with some peculiar interest outside of the corporation has reason to fear that his private interest may be unjustly injured by the corporation. He may have stock enough to elect a single director, and thus constitute himself a watchman and guardian of his peculiar interests. He could do nothing and prevent nothing, it may be said, and this is very true and ought to be true of all fair, honest, and straightforward measures; but the majority will not be likely to cheat him while he is looking on, and it is especially to secure *honesty* of management and respect for all the rights of *all* the stockholders that this plan is urged. If the new Constitution is adopted, this provision will go into effect next August.

## THE NEW YORK PRESS ON THE LAKE SHORE ELECTION.

The election of Horace F. Clark as President of the Lake Shore & Michigan Southern Railway Company seems to have suddenly awakened the New York papers to the fact that this is a Vanderbilt road. The *Times* says that the changes "are believed to point to a combination, offensive and defensive, from New York to Omaha, the powerful interests of New York Central, Lake Shore, and Rock Island being in accord, and, indirectly, the Chicago & Northwestern, in the same control."

The New York *Tribune* regards the election "as an important matter to New York," believing it to secure to that city the travel and traffic of the line; which, we may say, it has always had, and will be likely to have under any management so long as the travel and traffic wish to go to New York, and no longer. Of course it is not to be expected that the managers will favor the diversion of traffic from the Lake Shore line to the Philadelphia & Erie; but if shippers wish to send freight to Philadelphia or Boston, doubtless the Vanderbilt roads will take it as far as they can on its way as cheaply as any other line. Railroad companies in these days think more of getting traffic than of making discriminations in favor of this or that city. If such discriminations are made, it is usually for the benefit (real or supposed) of the road, and not of the city.

The *World* gives not only history but prophecy. It calls the election "another step towards a grand consolidation of railroads from the Atlantic to the Pacific coast;" says that "Mr. Torrance, the Commodore's son-in-law, will now return from Europe and assume the management in detail of the Lake Shore road;" and prophesies that there will be another consolidation in June, embracing the Chicago, Rock Island & Pacific, the Chicago & Northwestern and the *Milwaukee & St. Paul*. In support of this prophecy it says:

"If Vanderbilt and his party have fully determined upon consummating this scheme, it is folly for the public to shut their eyes to the future, or to argue that it cannot be carried out, for the Commodore has illimitable resources in cash, credit, power, influence, and an indomitable iron will. The notion of 33 per cent. dividend on New York Central was laughed at when first broached, as a visionary suggestion. The Commodore, however, has paid not only 33 per cent., but a scrip dividend of over 100 per cent., on New York Central and Hudson River, and is now paying 8 per cent. cash dividend, both on the scrip and original stock.

"It is well known that Vanderbilt, Tracy, Mitchell, Sage, Baxter, and a few of their friends control the Rock Island, Northwestern, Milwaukee & St. Paul roads, and that this programme of a general consolidation of the three roads, in harmony with New York Central and Lake Shore, will be ultimately consummated.

"With these 4,000 miles of road west of Chicago working harmoniously to throw all their traffic over the Lake Shore and New York Central lines, then it is intimated in the programme of the Vanderbilt and other great railway magnates that the shares of the Lake Shore and New York Central companies will be worth at least 125."

In the language of the stock exchange we would say that this article in the *World* looks very much like a "bull," if not a cock-and-bull, statement.

The *Herald* asserts that parties who have the "inside track" in the management of the Lake Shore Company have shown their distrust of the upward movement in the stock by selling out before the highest prices were realized. It says:

"The indications favor the belief that Lake Shore will eventually undergo a process of watering similar to that to which New York Central and Hudson River were both treated, but that such a policy will be immediately consummated there is the best reason for disbelieving. Those who are familiar with the history of the Stock Exchange for the past three years will remember the ups and downs, the vexatious delay and the heavy losses to the public which preceded the scrip dividend on Central and the final consolidation of the two roads. Lake Shore is now to undergo the same process. It will be worked up and down the scale of prices until the clique who control it have made millions out of the public. Then, when patience has been exhausted, the consolidation will come off—probably a year or two or three years hence."

As the company with its present capital in any ordinary season can now earn ten per cent. dividends regularly, and can probably do better if there are any combinations with roads west of Chicago, stock at par ought to be a good investment, whether it be good for speculation or not.

## MERRILL ON RAILROAD BRIDGES.

*Iron Truss Bridges for Railroads, by Brevet Colonel William E. Merrill, Corps of Engineers United States Army. D. Van Nostrand, Publisher, New York.*

This work is worthy of commendation and at the same time provokes criticism. It is a worthy effort on the part of the author to solve one of the problems of bridge construction;—that of finding the least amount of material which is necessary for certain forms of trusses for sustaining the same load; or, to change ends with the problem, given bridges of certain forms and all of the same weight of material, to find which will sustain the greatest moving load. Many other problems of a practical character arise in the construction of a truss, but these wisely form no part of the author's consideration. He has presented his views in a clear and intelligent manner; and the ingenuity displayed in coloring the figures so as to present certain facts to the eye, forms no inappreciable part of the merits of the work. The reduction of the "formulæ for obtaining the strength, volume, and weight of a cast iron pillar under a strain of compression" will be very acceptable to those who have occasion hereafter to make investigations involving these conditions. As a whole, from the author's stand-point, the work has been well done. But the work invites criticism from the theorist on account of the character of the investigations, and will provoke criticism from the advocates of certain systems, because his conclusion unwittingly sides with a particular system. This grand conclusion is, "The Post Truss is the lightest of the seven" which he considered; but some errors which he has made with the principles of the solution make the difference between this and at least one other—the Linville Truss—much greater than really exists.

Although his analysis of the strains on the counter-struts and counter-ties differs from those of some previ- writers, yet it is none the less erroneous. There seems to be a mystery about the strains on these members which is not worthy of the scientific members of the profession. Their office is just as peculiar, and no more peculiar, than that of a main tie, or a main brace.

A main-strut transmits all the vertical force at its end towards one abutment, and similarly a counter-strut transmits *all the vertical* force at the end of it to the same abutment. A correct analysis knows no distinction between a main and counter. The only distinction is in *their place;* it being unfortunate for the reputation of the counter that it is on the opposite side of the centre from the corresponding main brace; or in other words, the main and centre incline in opposite directions from the centre. But it seems to have escaped the attention of many theorists that, counting from *the ends*, the main and counter incline the *same way*, either towards or from the end.

Without determining the exact value of the strain, it seems that a slight consideration would convince us that a *main* and *counter* in the same panel will not both be strained at the same time. And yet this fact escaped the attention of our author, as appears on page 73, where he says in regard to the stress on the vertical ties, that "besides carrying the vertical weight on the strut, *the tie carries the vertical weight borne at the same time by the counter-strut.*" The italics are ours for the purpose of calling the attention of the reader more quickly to the exact point which we desire him to notice. This error has caused a computed stress in excess of the actual, for the Jones' Truss, of over 6,400 pounds; or in the final result for both trusses, of over 64,000 pounds (see page 73). (It is correct to add one-half the weight of the locomotive to the central tie). This error is not committed against the Post Truss.

But to return to the "counters." If the principle

above stated is correct, then an examination of the table on page 76 shows that for the Jones' Truss six counter-struts might be omitted, which will remove a computed stress of 106,612 pounds on 4,089.9 pounds of cast iron. For the same reason, the table on page 84 shows that for the Murphy-Whipple Truss, 70,968 pounds of stress may be omitted, and 430 pounds of wrought iron. Similarly we find that there may be omitted from the Whipple-Murphy Truss 70,968 pounds of stress; from the Post Truss, 66,132, and from the Linville, 50,686 pounds. These results are evident from the tables, but an exact calculation would show that the stresses on the remaining counters near the center are too large.

On page 103, in regard to the Linville Truss the author says: "We have made the depth of this truss twenty-five feet, as in no other way could we secure panel lengths of twelve and one-half feet, whilst conforming to the practice of the builders of the truss. *The increase of the depth of truss is no less, as what is lost by increasing the length of the posts and braces is made up by the diminution of the strains.*" The italics are ours again. Is this correct? and if correct in regard to the strains is it true that no more material is required, as we are led to infer.

If the strains on the several parts were inversely proportional to the depth of the truss, then the statement in regard to the strains would be correct. But the strains do not follow this law, except in regard to the chords. The strains on the vertical posts are independent of the depth; and upon the inclined ties or braces they vary as the secant of the inclination to the vertical. But even if the statement were true in regard to the strains, it would not be true in regard to the weight of the material unless the strength varied directly as the strain. In the case of tension, it does so vary, but in compression the weight varies, according to the author's formula on page 108, as the $\frac{1}{1.68}$ power of the strain and as the $\frac{1.79}{0.94}$ power of the length of the piece.

These principles applied to the Linville Truss given by the author, but with the depth reduced from 25 feet to 18 feet 6 inches, and we find the following approximate results:

The weight of the material in the lower chord would be increased about 1,430 pounds; in the upper about 1,290; or in both, about 2,720 pounds. The material in the vertical posts, including one-half of the central one, would be diminished about 6,790 pounds due to the direct stress, and increased about 506 pounds due to the 1-17 of the increased compression on the upper chord. To find the change of weight in the inclined ties, let $s$= the depth of the truss and $a$ the run of a tie; then the length will be $\sqrt{a^2+x^2}$; and the secant of the inclination $=\frac{\sqrt{a^2+x^2}}{x}$; and the weight *varies* as the product of these, or as $\frac{a}{x}s+x$. In our example $a$=25 feet, and for $x$=25 feet the expression becomes 50; and for $x$=18½ feet, it becomes 52.4, or an increase of nearly 5 per cent. These corrections make a diminution of nearly 3,300 pounds of metal in one truss. This still leaves the Post Truss 700 pounds lighter than the Linville,—a quantity quite too small to give the former any material advantage over the latter.

We have not arrived at an exact numerical solution, as our main object is to indicate the errors in the method of solution. The author has sought numerical results, but he has failed, in our opinion, to make a correct solution of any one of the trusses which he has considered. But enough has been done to show that their practical merits must be decided on other grounds.

Another point of a different character deserves notice. On page 126 the author says that cast iron is more rigid than wrought iron. This is a popular fallacy, as may be shown by direct experiment and also deduced from the co-efficient of elasticity. A piece of cast iron of the same *form* and *dimensions* as one of wrought iron will bend more—and as a mean value 50 per cent more—than the wrought iron piece.

Cast iron, within certain limits, is quite flexible. The advantages of cast iron are well known, but it is more treacherous than wrought iron. If wrought iron of any desired form could be secured as cheaply as cast iron, it would entirely supercede the latter, because it is more rigid and more reliable.

## Zerah Colburn.

This country has produced many eminent engineers, but few eminent engineering writers, and fewer still engineering journalists. Doubtless the most eminent of the latter, not only of America but of the age, was Zerah Colburn, a man of genius, who, receiving only such rudiments of an education as a New England common school could furnish, and his first, and for some time his only, technical education in a New England machine shop, trained himself by force of talent and an enthusiastic devotion to the study of mechanics and engineering, until in a short time he attained extraordinary proficiency in these fields, and at the same time one of the readiest, clearest and most forcible writers on technical subjects that the world has known. Early in life he contributed a series of articles on the locomotive to the *American Railway Times*. Afterwards he edited in New York the *American Railroad Journal* and the *Railroad Advocate*. He then went to London and edited the *Engineer*, the leading cigineering publication in the language at that time. He afterwards established a journal called the *Engineer*, somewhat similar in character, in New York. It was better than any periodical of the kind in this country before or since, but it was not sustained, and Mr. Colburn returned to London and resumed his connection with the *Engineer* until, a few years ago, he commenced the publication of *Engineering*, one of the most valuable technical periodicals ever published, which has attained a great success, and especial favor in America, as it has paid great attention to American engineering works. This journal he contiuued to publish until about two months ago, when he returned to America, and on the 25th of April last, at Belmont, Mass., he was found dead, evidently having committed suicide. He was but thirty-seven years of age, yet had already done such a service to his profession as few of the ablest men have done in the longest lives.

## Lake Shore & Michigan Southern Earnings in 1869.

Within the year 1869 the Lake Shore & Michigan Southern Railway as it now exists was formed by no less than four consolidations. In the first place the Cleveland & Toledo and the Cleveland & Erie roads were consolidated. Then these were consolidated with the Michigan Southern & Northern Indiana, after which the line was completed to Buffalo by a consolidation with the Buffalo & Erie. Some time later what is now known as the Kalamazoo Division—the road from White Pigeon northward through Kalamazoo and Allegan to Grand Rapids—was added. Thus the road has varied greatly in length during the year, and there has been a similar variation in the earnings. Accounts on the different roads of the combination were kept in various ways, and it has been found very difficult to present regular and uniform statements of the business of the road for the whole year. Under these circumstances it has been determined not to publish an annual report for the year 1869.

At the annual meetings last week, the following statement of earnings and expenses were given:

| | | |
|---|---|---|
| Gross receipts from all sources | | $12,945,598 40 |
| Operating expenses | $7,419,165 91 | |
| Taxes, State and National | 492,361 84 | |
| | | $7,911,527 65 |
| Net earnings | | $5,034,070 75 |
| The disbursements have been, for interest on funded debt and dividends of June and December, each four per cent. respectively, and taxes | | $4,317,698 06 |
| Leaving a surplus of | | $716,372 69 |

This statement gives the earnings of the line between Buffalo and Chicago for the whole year, and of the Kalamazoo Division for the last quarter.

From this statement it appears that the operating expenses, (including taxes) amount to 61 per cent. of the earnings, which is perhaps the average on good roads in this country.

## The Conductor's Life Association.

The following is a statement of losses paid by the United States Conductors' Mutual Life Insurance Association for the month of April, 1870: John W. Thiell, Passenger Conductor on the New York & Harlem Railroad, died from disease April 6; premium, $2,840. H. B. Ross, Passenger Conductor on the Indianapolis & St. Louis Railroad, also died from disease April 21; premium, $2,840. By reference to the report of losses for March, it will be seen that the membership in this association is steadily on the increase, it having increased forty members in thirty days. If this rate is kept up it will soon be one of the largest mutual Associations in the United States.

—A circular from J. Edgar Thomson, President of the Pennsylvania Railroad Company, announces the appointment of J. N. McCullough, General Manager of the Pittsburgh, Fort Wayne & Chicago Railway, as General Manager of the Erie & Pittsburgh. Mr. McCullough has issued a circular announcing the appointment of J. D. Layng as General Superintendent, Wm. P. Shinn, General Freight Agent, and F. R. Myers, General Passenger and Ticket Agent of the road. The last two gentlemen hold two similar positions on the Pittsburgh, Fort Wayne & Chicago Railway, and Mr. Layng is Superintendent of its Eastern Division. All business with other companies will be transacted by the the Pittsburgh, Fort Wayne & Chicago Railway at its general office in Pittsburgh.

—Postal cars are to be put on the Missouri Pacific to run between St. Louis & Atchison.

# Chicago Railroad News.

### Personal.

David Dows, a director of the Chicago, Rock Island & Pacific Railroad, with a party of about twenty friends, arrived n this city last week on the way to Salt Lake. The party came in the magnificent car "San Francisco," of the Rock Island's line, which was sent to Albany for them. Assistant Superintendent Hall went with them from Chicago.

C. P. Leland, who was re-elected Auditor of the Lake Shore & Michigan Southern Railway Company last week, has just removed his residence from Chicago to Cleveland.

George S. Bangs, who has charge of the railroad post office business in the Northwest, is now in Washington, filling temporarily the place of George B. Armstrong, Superintendent of Railway Mail Service for the United States.

S. C. Hough, who was formerly Western Passenger Agent of the Michigan Southern Railroad, with headqnarters in this city, is now at Kentville, Nova Scotia, in the service of the Windsor & Annapolis road.

### Chicago, Rock Island & Pacific.

An order from Hugh Riddle, General Superintendent, dated May 7, announces that the Iowa division will be subdivided for convenience of operating as follows: Eastern Iowa Division, Davenport to Brooklyn, 104 miles; Washington Branch, Wilton to Washington, 49 miles; Central Iowa Division, Brooklyn to Stuart, 110 miles; Western Iowa Division, Stuart to Missouri River, 96 miles. Under this arrangement A. Kimball is Assistant Superintendent and G. W. Dye Roadmaster of the Western Iowa Division and the Washington Branch, and H. F. Royce Assistant Superintendent, Wm. H. Carson and J. H. Preston Roadmasters of the Central and Western Iowa divisions.

The dummy train between Chicago and Blue Island is doing a good and growing business, a great many people going out to Washington Heights to select lots and superintend the construction of buildings.

### Lake Shore & Michigan Southern.

The Buffalo *Commercial Advertiser*, since the new election, says that it feels "sure that, in any event, the principal offices "of the Lake Sore & Michigan Southern Railway will soon "be changed from Cleveland to this city, and we anticipate "important additions to the works of the company already "here."

We understand that E. B. Phillips, late President, and J. H. Devereux, late Second Vice-President of the Lake Shore & Michigan Southern Railway, are to have positions in connection with the line as General Managers.

### The Baggagemasters' and Brakemen's Convention.

We gave last week the first day's proceedings of this convention. On the second day the Constitution was amended so as to admit employes of Canadian railroads to the Association and some other amendments were adopted. A proposition to make an assessment of ten cents per member for every case of severe injury was rejected.

The Secretary was instructed to furnish the secretaries of each road with printed blanks to serve on members in case of death, showing that an assessment is due, and stating the name of the deceased, and cause of his death.

The old officers were re-elected. They are: President, F. Wallington, Michigan Central Railroad, Detroit; Vice President, J. Glading, Philadelphia, Wilmington & Baltimore, Railroad, Philadelphia; Secretary and Treasurer, J. G. Rodgers, Detroit & Milwaukee Railroad, Detroit.

The following were chosen as members of the Executive Committee: E. Martien, Pennsylvania Railroad, Philadelphia; W. F. Allen, Hannibal & St. Joseph; F. E. Brackett, Milwaukee & St. Paul; E. M. Gillespie, Baltimore & Ohio; M. Lotterkous, Michigan Central.

It was decided to hold the next annual meeting in Philadelphia.

A social meeting and supper were had Friday evening at the Adams House.

## NEW PUBLICATIONS.

*The Traveler's Official Guide* for May comes to us from Philadelphia very neatly printed, in every way good to look at. But the indispensable qualities of a guide-book are fullness and accuracy. These requirements the *Official Guide* fulfils to a remarkable degree. No one who has not tried it can tell how extremely difficult it is to keep track of the construction and extension of railroads in this country at the present day. So it would be hardly possible for an editor, unassisted, to keep the list of roads, with their stations and distances, complete. Add to this the time tables which the guides publish, and it is simply impossible for such a work to be correct without the assistance of the railroad officials. The editor of the *Official Guide* is fortunate in having such assistance. The general ticket agents throughout the country give him their hearty co-operation—not the less, doubtless, now that the *Official Guide* is their property—and by their aid the book is made accurate and full to a degree hardly known in any similar work heretofore. How important this active sympathy on the part of railroad officials must be will be evident when we remember that the corrections of their tables must come from them; and if they are forwarded to the *Guide* as soon as prepared, it can make the changes in the book almost as soon as they are made upon the roads; whereas if they are delayed or not sent at all, the guide is likely to be late in publishing them, and perhaps discovers the change only after another has gone into effect.

The editor, fortunate in having his material furnished him, compiles the work with the utmost care, and with excellent judgment. The page is so long that time tables on long roads are presented clearly, and maps on a large scale show to good advantage.

We find in the May number among roads which we have never seen represented in a guide before the Chicago & Southwestern; the St. Louis Division of the Rockford, Rock Island & St. Louis, (57 miles); the St. Louis & Southeastern; the part of the Indianapolis, Bloomington & Western between Bloomington and Leroy (53 miles); the maps of the St. Louis & St. Joseph and the Missouri Valley, and a fine full page map of the Central Pacific, showing all stations from Sacramento to Ogden.

A work so full and so accurate no traveler can afford to be without.

*Van Nostrand's Engineering Magazine* for May has about forty articles on subjects connected with civil and mechanical engineering, selected from American and English, and translated from French and German periodicals. Among the most interesting of these are "The Spectrum of the Bessemer Flame," by Dr. H. Wedding, translated from the *Preussische Zeitschrift;* "The Wetli System of Locomotion for Steep Inclines," from the London *Practical Mechanics' Journal;* "Effect of Sudden Loads on Cast Iron," from the *Building News;* "Performances of Engines," from the *Journal of the Franklin Institute;* "The Whitworth Gun," from the *Engineer;* "Hydraulic Riveting Machine," from the *Annales du Genie Civil;* "The Manufacture of Coke," from *La Houille;* "How Rails are Made in France," from the *Iron Age;* "Cutting and Filling," from the Swedish *Polytechnic Journal;* "The Fairlie Engine Trials," from *Engineering*, and "The Festiniog Railway," from the *Engineer*. Several of these and other articles are illustrated.

## BUFFALO CORRESPONDENCE.

BUFFALO, May 4, 1870.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Doubtless the story of the Frenchman who traveled constantly, not for business, nor for pleasure, but in the hope of meeting with a railroad accident, is familiar to the readers of the GAZETTE. He crossed the Ocean confident that industry would find its reward upon a famous broad gauge road, the initials of which are Erie; but, miraculous as it may seem, he was doomed, even then to disappointment. One day missing by two minutes the "Express" which did smash up, he was unable to longer endure his ill luck and committed suicide by shooting himself through the head.

This is very like an enthusiastic journalist I met on a train out of Philadelphia one Saturday night not long since. "Do you know," said he to me as we seated ourselves in the smoking-car, "that at one time I could not endure to travel on Saturday? Because until within the last year I was connected with a journal which printed no Sunday edition, now had I happened to be in a "smash-up" on Saturday, I should clearly have missed making a "hit;" for, though I was on the ground, my paper would have been beaten by the Sunday sheets. Now, thank fortune, I am on the ——— which appears every day in the week, and therefore am perfectly willing to travel Saturdays." Here is commendable devotion to one's calling.

He who has never seen life in the smoking-car of a night train, running between two great cities, has missed one of the best opportunities for making that most interesting and instructive of all studies, the different phases of human character. Perhaps this observation need not be confined to smoking-cars. It is applicable to railroad traveling in general. Being somewhat of an observing person, I should like, if it were not for taking up too much of your space, to relate some experiences which have been to me the source of no little amusement.

Yet this same smoking-car is generally very far from the most attractive place in the world, though at all times well patronized. It is always small, always dirty, always uncomfortable and not unfrequently a part of the baggage-car. Why cannot our railroad companies give us comfortable smoking cars, keep them at least reasonably clean and partially ventilated.

Railroad matters are quiet here. Governor Hoffman, and Governor Geary of Pennsylvania, have put a temporary quietus upon the enterprises most affecting this city and vicinity by vetoeing the State aid bills passed by the Legislatures of their respective States. A great deal has been said in the newspapers during the last few weeks upon the subject of "State Aid," and a reversion of feeling in some quarters has resulted from the discussion. There has been unquestionably a growing tendency to carry the thing too far; and now the general sentiment appears to be, even amongst some of those whose interests were centered in schemes which were unsuccessful applicants for aid, that the Governor's position is sound. Our State and National Governments are already overburdened with debt, and the people with taxation. Let our railroads be built by individual enterprise, or with, if need be, the assistance of localities directly benefited. The system of subsidies in general is fundamentally wrong. As a rule its operation is to enrich individuals at the expense of communities.

The Buffalo & Washington Railway is an important enterprise to this city and section, chiefly by reason of the better coal facilities it will bring. The city has already appropriated $700,000 in aid of the work, but its progress is terribly slow. Capital, of which there was thought to be an abundance within easy reach, is not forthcoming, and there is little prospect at present of an early completion of the road. The same, substantially, may be said of the Pine Creek road, so-called, which is to intersect the Philadelphia & Erie, at Jersey shore, Pennsylvania.

Canals *versus* railroads is a subject of vital interest here at the present time. The steady and now rapid decrease of the grain traffic *via* the all-water route to the seaboard, as indicated by reshipment and handling at this point, tells a sorry tale for the future commerce of Buffalo. Earnest efforts are being made to prevent this traffic, which has been the source of our prosperity, from seeking other channels, by some radical reforms in the canal policy of the State. Mr. Hatch's plan for funding the canal debt presented the only means of relief without direct taxation. It has been adopted, and the "funding bill" is now a law. A committee from the Board of Trade of this city met the Canal Board at Albany on Wednesday and secured a reduction of tolls equal to about 50 per cent. of last season's rates.

The grain movement at this point for the week ending last Saturday evening is suggestive of heavy through shipments by rail. The total receipts from the West were 407,858 bushels, of which 190,450 bushels were by Lake Shore Railway, and 217,408 by lake and the Grand Trunk Railway. This is exclusive of flour, of which there was received by lake 16,850 barrels, and by the Lake Shore Railway 18,700 barrels. The amount in store here has also been diminished by 42,097 bushels, making a total of 627,705 bushels that must have been moved eastward by rail.

Jay Gould, of the Erie Railway, was in the city Wednesday. His business was understood to be in connection with the live stock traffic. The Erie proposes to compete more than heretofore for this class of business and is meeting with success. I am informed that the road has already secured its full proportion of through stock and is even carrying Albany shipments, taking them *via* Brighamton and the Albany & Susquehanna Railroad.

It is reported that a party of engineers in the employ of gentlemen prominently identified with the Buffalo & Washington Railway are surveying the old line of the Buffalo & Allegheny Valley Railroad from Attica to Arcade. I have no definite information of the immediate purpose in view.

The Lake Ontario Shore Line Railroad project from Oswego is being pushed ahead. It is thought the work of construction will be commenced soon. The location through Cayuga county has been finally settled. Junction with the Southern Central will be formed at Fair Haven.

A meeting of the citizens of Roohester favorable to the construction of the proposed Rochester & Pittsburgh Railroad, and in favor of extending the aid of the city in some form to the enterprise, was held last Friday evening. A committee was appointed to confer with the city directors of the road concerning submitting and arranging conditions for issuing bonds of the city in exchange for first mortgage bonds of the road.

At a meeting of the stockholders of the Albany & Susquehanna Railroad on Monday it was unanimously voted to ratify the lease of the road to the Delaware & Hudson Coal Company—30,000 shares of stock were voted upon, leaving only 3,000 unrepresented.

Articles of Association have been sent to the office of the Secretary of State for the Schuylerville & Moreau Railroad Company. The road is to run from Schuylerville to Moreau Station—all in Saratoga county. Length of road 10 miles; capital stock fixed at $200,000.

The first directors are David Bullard, Chas. W. Mayhew, Geo. L. Ames, Jos. Bancus, A. L. Frime, E. C. Bullard and Jesse Billings.

This is to be a branch of the Renssalaer & Saratoga. Its construction will be commenced at once.

More anon. L. M. B.

—St. Louis on the 3d inst. voted by 2,296 majority for a proposition to widen the approaches to the bridge in course of construction at that point. The proposition authorizes the city to spend half a million dollars in widening streets at the western terminus of the bridge, in order to afford facilities for the immense traffic which is expected to pass over it.

—The Stockholders of the Wilmington, Charlotte & Rutherford Railroad Company, will hold a general meeting in Charlotte, South Carolina on Wednesday, June 1st.

## EXCURSION TRAVEL ON ENGLISH RAILROADS.

Another of our holiday seasons has passed over, and our railway managers, upon whom so much of the enjoyment of the public at such times specially depends, have discharged their arduous and onerous duties worthily and well. The railway companies receive but scant justice at the hands of the press and the public for their best performances. The safe and rapid conduct of such an enormous spurt of traffic as is thrown upon them in an Easter week, with such glorious weather as we have been favored with this year, is accepted as a matter of course, and calls forth scarcely a word of commendation—no expression of wonder, certainly no due meed of acknowledgement. How different the case when railways sustain some unforeseen and unpreventible disturbance of their arrangements, from which injury or loss of life or limb are suffered, then, by common consent, the press and the public "cry aloud and spare not." The enormous traffic safely conducted is what is seen, but little thought of; the forethought and care exercised to secure that safety is what is not seen, and not even dreamt of by the public. The special instructions elaborated by our metropolitan railway managers, applicable to the Easter traffic alone, would fill a moderate-sized volume. These relate to signals, order and times of trains, ordinary and special, and a number of different subjects, more various than can be even barely enumerated. They have to be mastered by engine drivers, guards, station masters, signalmen, and all others concerned in the working of the traffic of the respective companies, and failure to observe the instructions, in almost any particular, exposes to accident or disaster. It need not be said that there is no other means or agency whatever that could take such an excessive traffic as the railways have taken during the last week, or convey such a multitude of passengers between one point and another as rapidly. It may be added that there is no other carrying agency in existence that would have conveyed as many passengers—allowing them months for days to do it in—so safely. Tens of thousands of passengers in excess of the ordinary traffic have presented themselves at the booking offices on several days, and the railway system is elastic enough to have received and conveyed them all to their desired destinations, and brought them home again in safety. It has been argued by the advocates of cheap fares, and the carrying of passengers, like goods, by weight, that the passengers incur less cost, inasmuch as they "load themselves." This would scarcely be said by anyone who saw the crowds returning from the Greenwich Station on Monday evening last. The company exercises the utmost care, and enforces the most rigid regulations, in handling the unruly mob they have to deal with. If the passengers there on such occasions were admitted to the station and the platform in the ordinary way, the most frightful carnage would inevitably result. The Greenwich holiday traffic is peculiar. It has been said of the visitors and the season in a Hudibrastic couplet:—

> Then, lo! the rabble do come down
> From all the garrets in the town.

The mode of dealing with the returning passengers is to block the entrances, so as to admit only a single file, which is received into a barricaded pen, in which a batch, sufficient to fill a train, are confined until a down train has come in, has been emptied, and the passengers cleared off the platform. The gate of the barricade is then opened, and the stampede is a sight once seen never to be forgotten. The passengers then, indeed, load themselves, preferably in first-class carriages, the complement of a compartment seated for eight being on such occasions from 16 to 20 of all ages and sizes. On Monday, neither distinction of class, nor intervals of time, were observed in filling and running the Greenwich trains; they were simply crammed and despatched as quickly as considerations of safety permitted. Very heavy traffics were also conducted with safety on Good Friday and Easter Monday to other places of popular resort—to Hampton Court, Kew Gardens, Richmond, and other favorite localities, by the Southwestern, the Metropolitan, the North London, and other companies having connection. The Crystal Palace, fascinating as it is itself, and attractive as is the special bill of fare on all such occasions, draws a large concourse, who, in their orderly demeanor, contrast very favourably at the stations with some of the pleasure seekers who resort to other places. On Monday last, 35 heavy trains were dispatched from London Bridge Station to the Crystal Palace from ten in the forenoon till five in the afternoon. A large number of trains were also sent to the same destination from the Victoria Station. The most notable special railway performance of the week was probably the conveyance to and from Brighton of the volunteer army; for the smoothness, celerity, and precision with which this feat was accomplished, too much praise cannot be awarded to the ability, energy, and forethought of Mr. J. P. Knight, General Manager of the company. Thirteen special trains, two of them almost empty for returns, left the London Bridge Station with volunteers, between five and seven in the morning, and between five and six o'clock four trains left the Brighton Station at Victoria loaded with volunteers for the review. The Southeastern Company had also six special trains for the volunteers of Tunbridge, Ashford, Rye, Winchelsea, and other places in its district, who were conveyed *via* Hastings. The Southeastern had also six special excursion trains on the North Kent line, to Gravesend and other stations, all of which were well filled. We venture to repeat that the managers and all concerned in the extraordinary railway traffic of the last week are entitled to the highest praise for the successful manner in which it has been conducted.—*London Mechanics' Magazine.*

—The prospectus has appeared of the Manilla & Hong Kong Submarine Telegraph Company (Limited) with a capital £350,000 in £10 shares. It is proposed to lay a cable 650 miles in length from Hong Kong to Manilla, having connections throughout the Philipine Islands, by cable and land lines, to a further extent of 470 miles.

—Fred Knowland, long the New York agent of the Fort Wayne road, and afterwards the representative of the Pennsylvania Company on the Pacific coast, has been appointed General Eastern Agent of the Union Pacific Railroad, with headquarters in New York. He takes charge both of the freight and passenger business. The *Official Railway Guide* says of this appointment: "This selection is a proof "of Col. Hammond's penetration and discernment, because there are few men as "alive to the eccentricities and peculiarities of railroading in the American metropolis as Mr. Knowland; and although "his associations have hitherto been more "exclusively allied with passenger business, still there is no reason why he "should not achieve equal success and attain similar popularity in connection with "the freight department."

—On the 4th inst., the stockholders of the Illinois & St. Louis Bridge Company elected the following Board of Directors: Chas. K. Dickson, G. B. Allen, Barton Bates, James H. Britton, John G. Copelin, John R. Linberger, William McPherson, William Taussig, all of St. Louis; Amos Cotting, S. S. Humphreys, M. K. Jesup, Robert J. Kennedy, New York. Subsequently the board elected the following officers: President, Charles K. Dickson; Vice-President, R. L. Kennedy; Secretary, J. A. Dillon; Treasurer, J. H. Britton; Auditor, D. C. Tobin; Executive Committee, Wm. Taussig, W. McPherson, J. H. Britton.

—H. P. Clough, Cincinnati freight agent of the Erie and the Atlantic & Great Western roads, celebrated his silver wedding on the 2d inst., at Middletown, Ohio.

—S. H. Duncan succeeds W. H. Ijams as Acting Auditor of the Baltimore & Ohio Railroad Company. He was formerly the company's claim agent at Washington.

—A convention of superintendents of Western railroads is to be held in Indianapolis on the 13th inst. to arrange the summer time tables.

## PUBLISHER'S ANNOUNCEMENTS.

*The Railroad Gazette.*

We give below a few more selections from notices of newspapers and periodicals:

"As a live railroad paper, treating on all topics connected with transportation, and presenting weekly all the latest railroad news of the country, the GAZETTE stands without a rival.—*American Builder.*"

"It will henceforth take the first rank among publications of this character, either in this country or elsewhere, and will supply a medium for general railway intelligence anxiously sought after by officials and the general public."—*Travelers' Official Railway Guide.*

"Is a most excellent railway paper, and we cannot imagine how anyone interested in railways can afford to do without it."—*Appleton's Railway Guide.*

"Conducted with spirit and enterprise."—*The Observer (Chicago.)*

"Without doubt the Chicago RAILROAD GAZETTE is the most enterprising and ably conducted railroad journal which reaches us. * * * * * It is conducted with energy and skill and ought to have an extensive circulation among railroad men and telegraphers."—*Philadelphia Sunday Morning.*

"The most interesting journal of that class in the country."—*Lake City (Minn.) Leader.*

"Filled with useful railway literature."—*North American and United States Gazette.*

"Replete with railroad and general transportation news."—*Houston (Texas) Times.*

"An invaluable paper to all railroad men."—*Waterville (Texas) Telegraph.*


**Turn Tables.**

F. C. LOWTHORP,

Civil Engineer, Patentee & Builder,

78 E. STATE STREET,

TRENTON, N. J.

IRON AND BRASS CASTINGS.

**Murray Iron Works Company,**

BURLINGTON, IOWA.

Castings in Iron, Brass, Gun and Bell metals, of every description, in green or dry sand or loam, with or without Patterns. Especial attention to

**Car Brasses, Babbit Metal, and Locomotive Bells.**

Sole Agents for

WATERS' PATENT LIME EXTRACTING HEATER,

— AND —

Bartleit's Pat. Automatic Lubricating Sleeve.

C. L. RICE, PRESIDENT.
SAM'L R. BARTLETT, Sec. and Treas.

**THE INTERIOR.**

**A New Religious and Family Journal.**

CAPITAL STOCK.....$50,000.00

TERMS—$3.50 a year in advance. $3 after 90 days.

Advertising Rates Furnished on Application.

**SEND FOR A LIST OF PREMIUMS.**

Published for the Western Presbyterian Publishing Company.

ARTHUR SWAZEY, *Editor-in-Chief.*
C. VAN. SANTVOORD, D. D., *Assistant Editor.*
W. S. MILLS, Publisher.

OFFICE—Room 5, Monroe Building, corner of Clark and Monroe streets, Chicago, Ill.

The leading paper of Michigan, the Detroit *Daily Tribune*, thus speaks of THE INTERIOR:

"We have received the first number of THE INTERIOR, the new Presbyterian paper just established at Chicago, and designed to subserve the wants of that re-united denomination throughout the great and growing West and Northwest. It is a beautiful specimen of typography and tasteful make-up, and abounds in excellent matter for a religious paper, both useful and entertaining. Its Eastern cotemporaries of the same denomination will have to look well to their ways, or they will be outstripped by this new competitor."

The *Standard*, the principal organ of the Baptist Church, says of THE INTERIOR:

"It is a large, handsome, first-class paper in every respect. * * We congratulate our Presbyterian brethren of the Northwest in being represented by a peer of the best religious journals in the country."

THE BEST

**FIRE PROOF SAFE**

IN THE WORLD,

*Is now Manufactured* IN CHICAGO,

-BY-

HERRING & CO.

40 STATE STREET.

**The Best Bankers' Safe**

IN THE WORLD,

*Is Manufactured in Chicago by Herring & Co.*

The above Bankers' Safes are lined with the Crystalized (or Franklinite) Iron—the only metal which cannot be drilled by a Burglar.

HERRING & CO., 40 State St.
Manufactory:—Corner 14th St. and Indiana Ave.

**WM. U. THWING,**

PATTERN

—AND—

**Model Maker!**

Calhoun Place, Rear of No. 120 Dearborn Street, Chicago, Third Floor.

Employing none but the best workmen, and having superior facilities, I am prepared to do the best work (using the best materials) at low figures, and guarantee satisfaction. Patent Office Models a specialty.

ILLINOIS

**Manufacturing Co.,**

479, 481 & 483 STATE ST., CHICAGO,

Manufacturers of

RAILWAY CAR TRIMMINGS,

AND

Removable Globe Lanterns.

O. A. BOGUE, Pres. JAS. E. CROSS, Supt.
A. H. GUNN, Sec'y. J. M. A. DEW, Ass't Supt

**RUFUS BLANCHARD,**

146 Lake St., Chicago,

Has Issued a NEW STYLE of

MAPS!

IN FLEXIBLE CASES,

Which are both cheap and convenient. The following States are now ready: Illinois, Iowa, Missouri, Kansas, Nebraska, Minnesota, Wisconsin, Indiana, Michigan and Ohio. Mailable on receipt of 25 cents. They show the counties, towns and railroads and are fine specimens of workmanship.

Established 1852.

**CLEVELAND FILE WORKS,**

CLEVELAND, OHIO.

All descriptions of Files Manufactured and Recut. Also, dealers in *Best English Cast Tool Steel.* Orders solicited and satisfaction guaranteed. JOHN PARKIN, Prop'r.

**Notice to Bridge Builders**

AND

**RAILROAD CONTRACTORS.**

CHIEF ENGINEER AND GEN'L SUP'TS OFFICE, MOBILE & MONTGOMERY RAILROAD, MONTGOMERY, Ala., April 23, 1870.

On the first day of June next, the Mobile & Montgomery Railroad Company will be prepared to let to contract all the work embraced in extension of their Road, from the East side of Mobile Bay into the city of Mobile, a distance of about twenty miles.

3,500 feet First Class Bridging on Iron Piers;
2 Large Draw Bridges;
25,000 feet Pile Trestle Work;
150,000 cubic yards Earth Work;
20 miles Clearing, Cross Ties and track laying.

After the 15th day of May, the Plans and Specifications will be ready for the inspection of parties desiring to offer proposals for this work.

Address, C. JORDAN, Chief Engineer, Montgomery, Ala.

ANDREW CARNEGIE, PRESIDENT. THOS. M. CARNEGIE, VICE-PRESIDENT.
ANDREW KLOMAN, GEN. SUP'T.

**THE UNION IRON MILLS,**

Of PITTSBURGH, Pa.

Sole Manufacturers, under our own Patents, of

IMPROVED "I" BEAMS,

CHANNEL BARS,

Best Quality of

LOCOMOTIVE & CAR AXLES,

("KLOMAN" Brand.)

*"Linville & Piper's Patent"*

Round and Octagonal HOLLOW WROUGHT IRON POSTS,

—AND—

"Upset" BRIDGE LINKS

*GENERAL WESTERN OFFICE:*

No. 13 Fullerton Block, Dearborn-St., CHICAGO, ILLINOIS.

THE UNION IRON MILLS manufacture all sizes of Pipe Iron, Merchant Bar, Forgings, Hammered and Rolled Locomotive and Car Axles, from the very best iron. Splice Bars (or Fish Plates,) to suit all Hatterns of Rails. Bridge Iron and Bolts, "I" Beams, Girder Iron, Channel Iron, &c.

WALTER KATTE, Western Agent.

L. C. BOYINGTON. H. A. RUST.

**Boyington & Rust,**

BRIDGE BUILDERS,

— AND —

CONTRACTORS.

Nos. 2 and 3 Andrews Building,

157 LASALLE ST., CHICAGO.

Builders of Iron, Combination and Howe Truss Railroad and Highway Bridges, Roofs and Engine Turning Tables.

HARRISBURG

**Foundry and Machine Works!**

(Branch of Harrisburg Car Mfg Co.,)

Harrisburg, - - Pennsylvania.

MANUFACTURERS OF

**MACHINISTS' TOOLS!**

— SUCH AS —

LATHES, PLANERS,
Shaping and Slotting Machines
Bolt Cutting & Nut Tapping Machines, &c.

W. T. HILDRUP, *Treasurer.*

JOHN S. NEWBERRY,.....President.
E. C. DEAN,.....Treasurer and Manager.

**Michigan Car Co.,**

MANUFACTURERS OF

**RAILROAD CARS!**

200 Larned Street West,

DETROIT, - - - MICH.

JAS. McMILLAN, Sec. JAS. McGREGOR, Sup't.

**John Blakeley,**

DEALER IN

WOOL AND COTTON WASTE,

For Railroad and Steamboat Use,

Steam Packing, &c.

233 Church Street, Philadelphia, Pa.

SOLE AGENT FOR

Cleveland Steam Gauge Co.

HOLT'S PATENT STEAM GAUGES,

For Locomotive and Stationary Engines, Locomotive Spring Balances, Water Gauges and Test Pumps.

JOURNAL

OF THE

**FRANKLIN INSTITUTE!**

EDITED BY

PROF. HENRY MORTON, PH.D.,

Assisted by the Committee on Publications.

SUBSCRIPTION, $5.00 PER ANNUM.

This Journal, devoted to Mechanical and Physical Science, Civil Engineering, and the Arts and Manufactures, is published in monthly numbers of seventy-two pages each, forming two volumes per annum, illustrated with engravings and wood-cuts. It contains original and extracted articles on all subjects of interest to the Civil and Mechanical Engineer, to the Manufacturer and to the man of Science, as well as much general information on Scientific subjects, which is likely to interest the general reader.

The Journal is now in its forty-third year of publication, and has become a standard work of reference.

**Terms of Subscription:**—Five dollars per annum; payable on the issue of the sixth number. When the full subscription (five dollars) is paid in advance, the numbers will be sent FREE OF POSTAGE. Communications and letters on business must be directed to the

Actuary of the Franklin Institute, Philadelphia.

NORTH CHICAGO

**Rolling Mill**

COMPANY,

Manufacturers of and Dealers in

**Railroad Iron.**

OLD RAILS RE-ROLLED,

—AND—

**Rails of Any Desired Pattern**

Furnished promptly to order.

STEPHEN CLEMENT,.....President.
O. W. POTTER,.....Secretary and Gen. Sup't.

Office, 82 La Salle St., Chicago.

THE MILWAUKEE

**IRON COMPANY!**

OF MILWAUKEE, Wis.,

Is now prepared to Manufacture

**Railroad Iron,**

OF THE MOST APPROVED PATTERNS

—AND OF—

**Unsurpassed Excellence!**

OLD RAILS RE-ROLLED.

CAPACITY OF WORKS:

**25,000 Tons of Rails per Annum.**

E. B. WARD, *President.*
ALEXANDER MITCHELL, *Treasurer.*
JAS. J. HAGERMAN, *Secretary and Agent.*
WM. L. POTTER, *Superintendent.*

City Office, No. 90 Michigan St.

*General Office at the Works,*

MILWAUKEE, WIS.

WYANDOTTE

**Rolling Mill Company,**

Manufacturers of and Dealers in

**Railroad Iron,**

MERCHANTS' BAR,
ROUND, SQUARE, and
FLAT IRON of all Sizes.
BOILER RIVETS,
**CABLE CHAINS, FISH JOINTS AND CHAIRS, Etc.**

Made from the Best Charcoal Lake Superior Pig. Also a very Superior Quality of

**Extra Flange Boiler Plate,**

Manufactured from
No. 1 Charcoal Lake Superior Pig,
REFINED, KNOBBLED, TWICE-HEATED AND HAMMERED,

The greatest care being taken to make it fully equal to the best LOW MOOR IRON.

☞Orders solicited and executed with despatch. N. B.—All Iron manufactured at these Works, Warranted.

STORE & OFFICE Foot of Wayne St., DETROIT.

ADDRESS ORDERS TO

WM. H. ZAEBRISKIE, President,.....DETROIT, Mich.
S. L. POTTER, General Sup't,.....WYANDOTTE, Mich.

AMERICAN

**Hand Stamp and Patent Company.**

Manufacturers, Agents and Dealers in

**Hand Stamps, Notary's Seals,**
**Burning Brands, Baggage Checks,**
**Stencil Cards, Plates,**
**Inked Ribbons in any Size.**

Manufacturers of

Secor's Patent Pen Racks, Embossing Seals, with Changeable Date, Secor's Patent Writing and Shipping Ink in all Colors.

*Secor's Repeating Lights,*
*IXL Draw Lights, IXL Lanterns,*

*Sewing Machine Castors,* for all Machines, *Secor's Patent Magic Star Pad Ink, in all Colors.* Also, dealers in

**PORTABLE PATENTS,**

OF ALL KINDS.

**Office, 139 Madison St., Room 55.**

W. P. JORDAN, Pres. L. A. MARTIN, Sec.
GEO. E. S. SECOR, Treas. and Gen. Supt.

☞ Agents wanted in every city or town.

**SEWER PIPE, DRAIN TILE,**

**Bath Brick & Fire Brick,**

Manufacture and Sold by

**THE JOLIET MOUND CO.,**

Joliet, Will Co., Illinois.

**Office & Yard in Chicago,**
**Corner Wells and Polk Sts.**

☞ Orders and inquiries promptly attended to.

JOLIET MOUND CO.

**UNION TRUST CO.,**

OF NEW YORK.

No. 73 Broadway, cor. Rector St.

***Capital,* - - 1,000,000.**

[All paid in and securely invested.]

INTEREST ALLOWED ON DEPOSITS, which may be drawn at any time.

This Company is by law and by the order of the Supreme Court made a legal depository of money. It will act as Receiver in cases of litigation, take charge of, and guarantee the safe keeping of all kinds of Securities, and collect coupons and interest thereon.

It is authorized by law to accept and execute all TRUSTS of every description, in reference to both real and personal property committed to them by any person or corporation, or transferred to them by order of any of the Courts of Record, or by any Surrogate.

It is especially authorized to act as Register and Transfer agent and as Trustee for the purpose of issuing, registering or countersigning the certificates of stock, bonds or other evidences of debt of any corporation, association, municipality, State or public authority, and will pay coupons and dividends on such terms as may be agreed upon.

In giving special prominence to this department of its business, attention is particularly called to the paramount advantages of employing this COMPANY in the capacity of AGENT, TRUSTEE, RECEIVER or TREASURER, in preference to the appointment of INDIVIDUALS. A guarantee capital of ONE MILLION DOLLARS specially invested by requirement of its charter, and a perpetual succession; a central and permanent place of business, where business can be transacted daily, without disappointment or delay: its operations directed and controlled by a responsible Board of Trustees; and its entire management also under the supervision of the Supreme Court and the Comptroller of the State.

Permanency, Constant and Responsible Supervision, Guaranteed Security and Business Convenience and Facilities, may therefore be strongly urged IN ITS FAVOR on the one hand, against the Uncertainty of Life, the Fluctuations of Business, Individual Responsibility and General Inconvenience on the other.

ISAAC H. FROTHINGHAM, President.

AUGUSTUS SCHELL, HENRY K. BOGERT, } Vice-Presidents.

TRUSTEES.

| | |
|---|---|
| A. A. LOW, | JOHN V. L. PRUYN, |
| HORACE F. CLARK, | BENJ. H. HUTTON, |
| DAVID HOADLEY, | JAS. M. McLAIN, |
| EDWARD B. WESLEY, | W. WHITEWRIGHT, Jr. |
| GEO. G WILLIAMS, | HENRY STOKES, |
| J. B. JOHNSON, | HENRY E. DAVIES, |
| GEO. B. CARHART, | SAMUEL WILLETS, |
| PETER B. SWEENEY, | CORNELIUS D. WOOD, |
| JAS M. WATERBURY, | S. B. CHITTENDEN, |
| FREEMAN CLARK, | DANIEL C. HOWELL, |
| AMASA J. PARKER, | GEORGE W. CUYLER, |
| HENRY A. KENT, | JAMES FORSYTH, |
| WILLIAM F. RUSSELL, | R. J. DILLON, |
| | S. T. FAIRCHILD. |

*CHARLES T. CARLTON, Secretary.*

**F. E. Canda,**

BRIDGE BUILDER

—AND—

**GENERAL CONTRACTOR.**

No. 2 S. Clark St.,

CHICAGO, - - ILLINOIS.

*(Official Publication.)*

ANNUAL STATEMENT

OF THE

**HOME INSURANCE CO.**

OF CHICAGO,

In the State of Illinois, on the 31st day of Dec., 1869, made to the Auditor of Public Accounts of the State of Illinois, pursuant to law.

CAPITAL.

| | |
|---|---|
| Amount of Capital Stock paid up in full | $200,000 00 |

ASSETS OF THE COMPANY.

| | |
|---|---|
| Value of Real Estate owned by the Company | $ 1,000 00 |
| Loans on Bonds and Mortgages | 188,230 00 |
| Loans on Collateral Security | 25,587 53 |
| Cash on hand and in Bank | 8,071 17 |
| Premiums in course of collection and transmission | 7,621 48 |
| Office Furniture, etc. | 2,500 00 |
| Interest accrued, and Stamps on hand | 3,106 91 |
| Total Assets | $236,117 09 |

LIABILITIES OF THE COMPANY.

| | |
|---|---|
| Claims and Losses adjusted and in process of adjustment | $ 1,400 00 |
| Amount necessary to reinsure all outstanding risks | 15,167 10 |
| All other debts of the Company,—Salaries | 1,758 66 |
| Total Liabilities | $ 18,325 76 |

*FRED. LETZ, President.*
*THOMAS BUCKLEY, Secretary.*

Subscribed and sworn to before me this 26th day of January, 1870. WM. H. HOLDEN, N. P.

Home Office, No. 139 Madison-st.

**WALL PAPERS!**

WINDOW SHADES, &c., &c.

A choice and superior stock of the finest imported WALL PAPERS and WINDOW SHADES, for sale REDUCED PRICES, at

**No. 89 Randolph St.**

☞ Orders from the city or country for Paper Hanging, Calcimining, House Painting and Graining promptly attended to. The best workmen employed and satisfaction guaranteed.

F. E. RIGBY, Jr.

**The Mercantile Agency.**

**R. G. DUN & CO.'S**

**Reference Book!**

For the Semi-Annual Term, commencing July 1st.

It contains the names and business of individual traders and firms throughout the States and Territories, Canada and Nova Scotia, with their

*CAPITAL, CREDIT AND STANDING*

in the communities where they reside, revised by their own Exclusive Agents and Correspondents, upon fresh detailed reports.

**Several Thousand New Names**

Have been added since the last volume, and a vast number of changes made in old quotations.

**Names no longer in Business have been Dropped.**

This work has been faithfully executed with labor and care at great expense, and is offered to business men with the fullest confidence in its accuracy and reliability. For every estimate and gradation of credit in each individual case a report can be found upon the

**RECORDS OF THE AGENCY.**

THE REFERENCE BOOK may be seen at the office in New York and the other cities, and with

**Claims for Collection**

Promptly attended to throughout the United States and the British Provinces.

**R. G. DUN & CO.**

OFFICE:

**101 & 103 Wabash Ave.,**

*CHICAGO, — — ILLINOIS,*

**ALEX. ARMSTRONG, Manager.**

[Manager of the Pittsburgh Branch from 1854 to 1856.

**NOTICE!**

—TO—

**Railroad Companies and Bridge Builders!**

FOR SALE:

**3 Howe Truss Railroad Bridges**

COMPLETE.

100 ft. spans; built in best manner, and of heaviest description. Will be sold at less than cost to close out the business of Ledlie & Corse. Apply by letter or otherwise, to Room 25, ORIENTAL BUILDING, CHICAGO.

**TO ADVERTISERS.**

THE BEST MEDIUMS

OF GENERAL

**Western Circulation!**

**KELLOGG'S LIST,**

CONTAINING

**240 Country Papers.**

Terms of Advertising,

**Only TWO DOLLARS per Line,**

WITH A LIBERAL

**Discount to Heavy Advertisers.**

THIS IS BY FAR

**The Cheapest Advertising**

EVER OFFERED.

Parties desiring extensive Advertising in the West and Northwest, are invited to avail themselves of the unusual facilities of the undersigned for inserting advertisements in TWO HUNDRED AND FORTY

**LEADING COUNTY PAPERS.**

For further particulars, call upon or address the proprietor of this paper,

A. N. KELLOGG,

**99 & 101 Washington St.,**

**CHICAGO, ILL.**

J. E. FRENCH. W. S. DODGE. D. W. CROSS.

# Winslow Car Roofing Company.

## PATENT IRON CAR ROOFS.

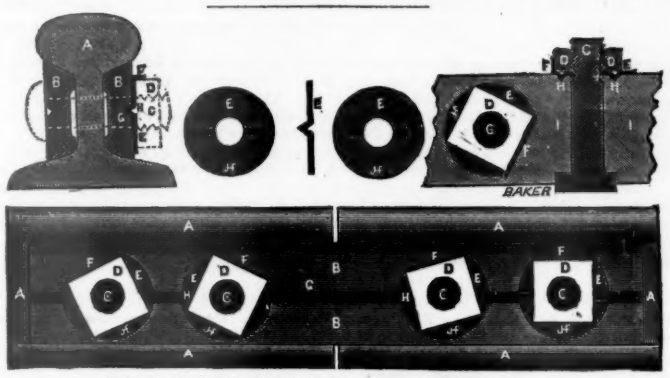
Established, 1859.

No. 211 Superior St. **CLEVELAND, O.**

Over 20,000 Cars covered with this Roof! We claim that these Roofs will keep Cars dry, and will last as long as the Cars they cover without any extra expense after once put on.

☞ SEND FOR CIRCULARS.

# Fisher's Lock Nut Washer!




Patented April 19th, 1869, by J. HYDE FISHER, Chicago, Ill.

A CHEAP, SIMPLE, DURABLE AND PERFECT LOCK,

To Prevent Nuts from Jarring Loose on Fish Plates, Cars, Engines, Carriages, Trucks or Machinery of any character where Nuts are used. Manufactured by

## FISHER & JACKSON,

53 La Salle Street, Chicago.

CHAS. J. PUSEY, P. O. Address—Box 5222. EDW'D H. PARDEE.

## Pusey & Pardee,

74 BROADWAY, NEW YORK.

# American and English Rails,

LOCOMOTIVES AND CARS, FISH-PLATES, SPIKES, &c.

*—SOLE AGENTS FOR—*

Atkins Brothers' Pottsville Rolling Mills, and G. Buchanan & Co., of London.

☞ Special attention given to filling orders for small T and STREET RAILS, of every weight and pattern.

OLD RAILS BOUGHT OR RE-ROLLED, AS DESIRED.

# Geo. C. Clarke & Co.,

# FIRE & MARINE INSURANCE.

No. 15 Chamber of Commerce.

GEO. C. CLARKE. SAM'L M. NICKERSON.

AGENTS FOR

New England Mutual Insurance Co., of Boston,
ASSETS OVER $1,140,000

American Insurance Company, - - of Boston,
ASSETS OVER $820,000.

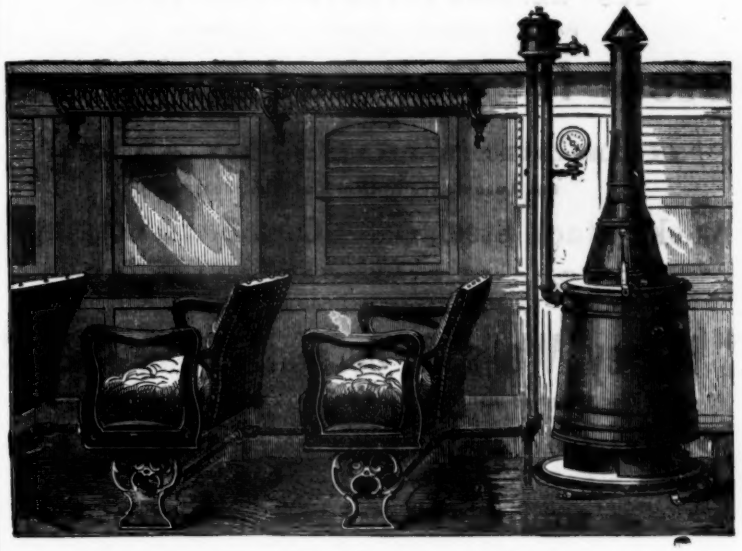
Independent Insurance Company, - of Boston,
ASSETS OVER $500,000.

North American Fire Ins. Co., of New York,
ASSETS OVER $770,000.

Excelsior Fire Insurance Co., - - of New York
ASSETS OVER $340,000.

Fulton Fire Insurance Company, of New York,
ASSETS OVER $810,000.

# WARMING AND VENTILATING
# Railroad Cars
# BY HOT WATER.



*BAKER'S PATENT CAR WARMER.—One way of Applying it.*

A very simple, safe and efficient plan for

# Warming Railway Carriages!

—BY—

## HOT WATER PIPES,

WHICH RADIATES THE HEAT DIRECTLY AT THE FEET OF EACH PASSENGER WITHOUT THE NECESSITY OF GOING TO THE STOVE TO GET WARMED!

☞ All the finest Drawing-Room and Sleeping Cars in the United States have it, or are adopting it. Full descriptive pamphlets furnished on application.

## Baker, Smith & Co.,

Cor. Greene and Houston Sts., N. Y., and 127 Dearborn St., Chicago.

# MANSFIELD ELASTIC FROG COMPANY

OF CHICAGO.

AMOS T. HALL, President. J. H. DOW, Superintendent.

Are now prepared to receive and promptly execute orders for RAILROAD FROGS and CROSSINGS, warranted to prove satisfactory to purchasers.

For DURABILITY, SAFETY and ELASTICITY—being a combination of Steel, Boiler Plate and Wood—they are UNEQUALED, as Certificates of Prominent Railroad Officials will testify.

The SAVING TO ROLLING STOCK AND MOTIVE POWER is at least equal to double the cost of the FROG. Orders should be addressed to

CRERAR, ADAMS & CO., Gen'l Agents,
No. 13 Wells Street, CHICAGO.

J. H. LINVILLE, PRESIDENT. J. L. PIPER, GEN. MANAGER. A. G. SHIFFLER, SUP'T & TREAS.

# The Keystone Bridge Company

OF PITTSBURGH, PENN.

Office and Works, 9th Ward, Pittsburgh, Pa. Philadelphia Office, 426 Walnut Street.

GENERAL WESTERN OFFICE:—13 Fullerton Block, 94 Dearborn St., CHICAGO, ILL.

☞ This Company possess unrivaled facilities for manufacturing and erecting every description of **Iron and Wooden Railway and Road Bridges, Roofs, Turn-Tables and Buildings, "Linville and Piper" Patent Iron Bridges, Self-Sustaining Pivot Bridges, Suspension Bridges, and Ornamental Park Bridges.** Contractors for Wooden or Iron Bridges of any pattern, as per plans and specifications. Circulars sent on application.

WALTER KATTE, ENGINEER. A. D. CHERRY, SECRETARY.

# PITTSBURGH CAST STEEL SPRING WORKS.

## A. French & Co.,

Manufacturers of Extra Tempered, Light Elliptic

# CAST STEEL SPRINGS,

FOR RAILROAD CARS AND LOCOMOTIVES,

*FROM BEST CAST STEEL.*

OFFICE AND WORKS:—Cor. Liberty and 21st Sts., PITTSBURGH, PA.

CHICAGO BRANCH, 88 Michigan Ave.

## HUSSEY, WELLS & CO.,

MANUFACTURERS OF ALL DESCRIPTIONS OF

# CAST STEEL!

**BEST REFINED STEEL FOR EDGE TOOLS.**

*Particular attention paid to the Manufacture of*

## Steel for Railroad Supplies.

**HOMOGENEOUS PLATES,**

**For Locomotive Boilers and Fire Boxes.**

**Smoke Stack Steel, Cast Steel Forgings,**

FOR CRANK PINS, CAR AXLES, &C.

Also Manufacturers of the Celebrated Brand,

## "Hussey, Wells & Co. Cast Spring Steel,"

☞ For Elliptic Springs for Railway Cars and Locomotives. ☜

**Office and Works, Pittsburgh, Pa.**

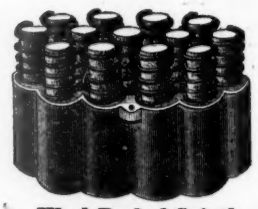
BRANCH WAREHOUSES:

**88 MICHIGAN AVENUE, CHICAGO.**

139 & 141 Federal St. Boston. | 30 Gold St., - - - New York.

## Union Car Spring Mf'g Co.

Sole Proprietors of the



Wool-Packed Spiral.

Hebbard.

HEBBARD CAR SPRING!

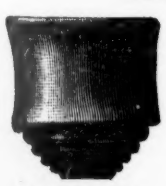
Offices: No. 4 Dey St., New York, and 19 Wells St., Chicago.

FACTORIES: JERSEY CITY, N. J., and SPRINGFIELD, MASS.

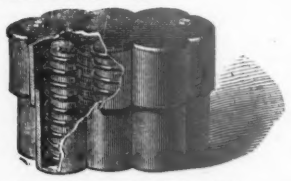
## Vose, Dinsmore & Co.,

NATIONAL SPRING WORKS,

MANUFACTURERS OF



Volute Buffer Spring.



Group Rubber Center Spiral Spring.

**VOLUTE BUFFER, INDIA RUBBER, RUBBER CENTRE SPIRAL, COMPOUND SPIRAL,**

AND OTHER

## RAILWAY CAR SPRINGS.

**No. 1 Barclay St., NEW YORK. | No. 15 La Salle St., CHICAGO.**

WORKS ON 129th AND 130th STREETS, NEW YORK.

## LEBANON MANUFACTURING COMPANY,

LEBANON, PENNSYLVANIA,

IS PREPARED TO BUILD AT SHORT NOTICE,

**HOUSE, GONDOLA, COAL, ORE,**

And all other Kinds of

# CARS!

Also, IRON and Every Description of CAR CASTINGS Made to Order.

DR. C. D. GLONINGER, President. J. M GETTEL, Superintendent.

## Important to Railway Companies!

THE following, which we take from one of our exchanges, is but an illustration of how much money railroad companies are and have been paying for the old-style baggage-check, and how easy it is for them to be daily purchasing baggage-checks, until they amount to millions ere they are aware of the fact:

"*A Rash Promise.*—A paper tells the following story of a young lady who is a pupil at one of the schools in this city, and who has already, it seems, beaten her father at mathematics. She modestly proposed that if her father would give her only one cent on one day, and double the amount on each successive day for just one month, she would pledge herself never to ask of him another cent of money as long as she lived. Pater-familias, not stopping to run over the figures in his head, and not supposing it would amount to a large sum, was glad to accept the offer at once, thinking it also a favorable opportunity to include a possible marriage dowry in the future. At the twenty-fifth day, he became greatly alarmed, lest, if he complied with his own acceptance, he might be obliged to be 'declared a bankrupt on his own petition.' But at the thirtieth day, the young girl demanded only the pretty sum of $5,368,719 12. The astonished merchant was only too happy to cancel the claim by advancing a handsome cash payment for his folly in allowing himself to give a bond—or his word he considered as good as a bond—without noticing the consideration therein expressed, and by promising to return to the old custom of advancing smaller sums daily until otherwise ordered."

In comparing the above with the cost of baggage-checks, it is well known by every baggage-man that to supply a road perfectly with checks, it is necessary that the baggage should have on it *a check which, of itself, indicates the station for which the baggage is destined*; if it has not, the baggage-check is not perfect or complete. As every intelligent person can conceive at a glance, to bring the checking of baggage to such a state of perfection with the old style of baggage-check would cost an immense amount of money, as per example: We will take the New Jersey Railroad; we will say that it has twenty stations; it will require one thousand checks from New York to Newark, one thousand from New York to Elizabeth, one thousand from New York to Rahway, one thousand from New York to New Brunswick, and so on to the whole twenty stations. Then we again commence with one thousand from Newark to all stations, one thousand from Elizabeth to all stations, and so on until all stations are supplied, then we have just commenced; as other stations are added, and other connections made, all this must be done over and over again, and there is no help for it so long as railroad companies continue to use the old-style check and system of checking baggage. The next question is, how to obviate the necessity of purchasing this immense amount of baggage-checks? Simply by adopting the Thomas Safety Baggage-Check and system of checking baggage. By its use, it matters not how many different stations are opened, or how many connections are made, the *one check will go to every one of them*, and, by so doing, save tens, if not hundreds of thousands of dollars to railroad companies, and, at the same time, obviate the necessity of purchasing checks by the million.

The following, from S. E. Mayo, Esq., General Ticket Agent of the Albany & Susquehanna Railway—a gentleman who has given the checking of baggage a most careful, practical consideration—is but one from nearly forty representatives of the best-managed roads in the country in reference to its incomparable value *both as a local and through check*:

"In reference to the Thomas Safety Railroad Baggage-Check, it has no equal; and, if I were not thoroughly convinced by personal experience, that it merits all and more than is claimed for it, I would not speak so highly in its favor. As you are aware, we have recently added a large number of new *through tickets* to our stock—with the Erie Railway, alone, some 38 different forms. With the old style of checking baggage, I should have been compelled to buy not less than 3,800 checks for those 38 stations, which is obviated by the Thomas system of checking baggage. Instead of covering the whole side of my baggage-room with 3,800 different forms of baggage-checks, I simply add 38 forms of station-cards to my collection, in a thirty-inch case, alongside of which are my brass checks for any station designated by card. Another great advantage possessed by this check over the old style, is, if we should discontinue our connection with any route, the Thomas Check is not lost or become useless, as is the case with the old style of checking baggage, but with the cards, they at once become available elsewhere. Experience daily convinces me that the Thomas Check *is the only economical, systematic and safe check in use*, and that it will not be possible much longer for its opposers to close their eyes upon its many great advantages over all other checks and systems of checking baggage, and it must ultimately commend itself to any and all who are not too prejudiced to give it a fair trial. I therefore recommend it with perfect confidence to all railroad companies as the best baggage check in use, *for both local and through travel*."

HENRY STEFFEE, Esq., G. T. A. of the Louisville, Cincinnati & Lexington Railroad, says:

G. F. THOMAS, Esq., 90, 92 and 94 Grand Street, New York:

DEAR SIR: It is with much pleasure that I am able to inform you that our baggage-men consider the Thomas Improved Safety Baggage-Check unequaled. They inform me that it facilitates the checking of baggage wonderfully, in consequence of being able to send, with any check, a piece of baggage from any station to any station, and not being compelled to spend several minutes in looking for a particular check for a certain station; by the use of your check, they save from one-half to two-thirds of the time required to check baggage by the old style of check, and with much more certainty. To stock our road as perfectly with the old style of check as we have with yours, would require, at the least calculation, full twenty times the number of checks, which, in place of simplifying, complicates the checking of baggage; your check obviates all this complexity, and so simplifies the business that it is impossible to make a mistake, unless through gross negligence or incompetency. Previous to the introduction of the Thomas Check, in consequence of the great expense, no road would even think of bringing the checking of baggage to such a state of perfection as yours does, it requiring such large quantities of brass checks to do the business *as it ought to be done*, which is the reason such a great number of railroads, even to this day, adhere to the old English style of pasting and chalking baggage. I am satisfied that, if the officers of all the railroads were as well acquainted with the superiority of your check in every respect as are the officers of those roads upon which it is in use, it would be universally adopted, *both as a local and through check*, not only on account of its accuracy, economy and certainty, but also in consequence of its unequaled advantages in facilitating and simplifying the whole baggage business.

S. SCHOCH, Esq., Superintendent of the Morris & Essex Railroad, says:

"We have used the Thomas Safety Baggage Check on our road over two years, during which time we have never lost a piece of baggage to which it was attached, but, on the contrary, the baggage in every instance arrives at its place of destination with unerring certainty. We do, therefore, without the least hesitancy, recommend its use to any railroad company, being fully satisfied, after the most thorough trial, that, for a safe, reliable railroad baggage check, it has no equal, and, were it at this time in use upon every road in the country, the checking of baggage would not only be reduced to a perfect system, but would also be the means of saving railroad companies fully one-half of the present cost of conducting the baggage business."

JAMES M. WHITE, Esq., Train Master of the Central Railroad of Georgia, says:

"We are much pleased with the Thomas Patent Safety Baggage Check. They are just the check required by railroad companies, as they can be prepared in advance, or changed in a moment, for any station, and *a very small number of brass checks does the work of many*. There is not the least doubt but that it will in time take the place of all other baggage checks now in use."

A. C. DAVIS, Esq., G. T. A. of the Belvidere, Delaware & Flemington Railroad, says:

"The Thomas Safety Baggage Check works to our entire satisfaction. No failure in the transmission of baggage since we commenced its use over two years ago. The baggage masters are pleased with them, and I am well satisfied they are the best baggage check in use, and better calculated to perform the various duties of *both local and through business* than any or all other baggage checks I have ever seen. Every check is, and has been, kept in constant use since we first commenced using them; and, so far as certainty, simplicity and economy are concerned, they have no equal."

☞ All necessary information in reference to the Thomas Patent Safety Railroad, Steamboat and Express Baggage Check will be given by addressing

**G. F. THOMAS,** Editor Appleton's R'y Guide,

**90, 92, 94 Grand St., New York.**

GENERAL FREIGHT DEPARTMENT.

# The Illinois Central Railroad

ARE PREPARED TO TAKE FREIGHT FOR

**Cairo, St. Louis, Peoria,**

**BLOOMINGTON, SPRINGFIELD, JACKSONVILLE,**

*And All Points in the Central and Southern parts of the State;*

**MOBILE & NEW ORLEANS BY RAIL OR RIVER**

And ALL POINTS on the MISSISSIPPI below CAIRO. Also, to

**Freeport, Galena and Dubuque.**

☞ Freight Forwarded with Promptness and Despatch, and Rates at all times as LOW as by any other Route.

BY THE COMPLETION OF THE BRIDGE AT DUNLEITH,

THEY ARE ENABLED TO TAKE FREIGHT TO ALL POINTS WEST OF DUBUQUE ☞ WITHOUT CHANGE OF CARS! ☜

DELIVER FREIGHT IN CHICAGO ONLY at the FREIGHT DEPOT of the Company, foot of South Water St. Parties ordering Goods from the East should have the packages marked:

**"Via Illinois Central Railroad."**

For THROUGH BILLS OF LADING, and further information, apply to the LOCAL FREIGHT AGENT at Chicago, or to the undersigned.

M. HUGHITT, Gen. Supt. J. F. TUCKER, Gen. Freight Agt.

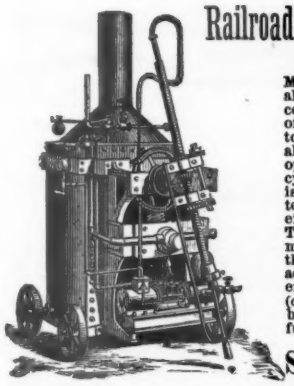
LESCHOT'S PATENT

DIAMOND POINTED

# Steam Drills!

—FOR—

Railroad Grading, Well Boring, Prospecting, &c.

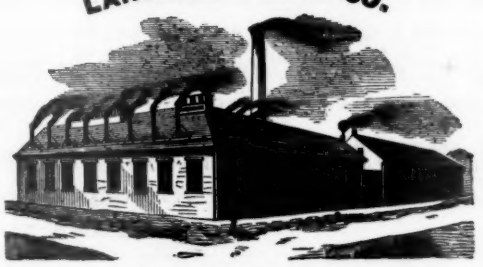


The unequalled efficiency and economy of these DRILLING MACHINES are fully established, and they are fast superseding all other inventions for ROCK DRILLING. They are constructed of various sizes and patterns to suit different classes of work, being adapted to Channelling and Gadding in quarries; to shafting, tunneling, prospecting and all open cut work in mines; also to heavy Railroad-grading and Sub-marine Blasting. They operate noislessly without percussion: and produce a perfectly cylindrical hole of uniform diameter. Their usual rate of boring is three to five (3 to 5) inches per minute in hard rock; eight to ten (8 to 10) inches per minute in slate and sand rock, and eighteen to twenty-two (18 to 22) inches per minute in coal TEST CORES, in the form of solid cylinders of rock or mineral may be taken out of mines from any depth—not exceeding one thousand (1,000) feet—showing the geological formation, character of mineral deposits, &c. These drills never need sharpening and no steel is consumed in boring—as the cutting points (*composed of rough, uncut diamonds,*) are practically indestructible. Boilers, Engines, Steam Pumps, and all necessary tools furnished with drills. Illustrated circular sent on application.

**SEVERANCE & HOLT, Man'f's,**

Office, 16 Wall Street, NEW YORK.

FILES LANCASTER FILE CO. FILES



MANUFACTURERS OF

**Superior Cast Steel Files.**

LANCASTER, PA.

# The National Iron Co.

[*Successor to Wm. Hancock, Rough and Ready Iron Works,*]

ESTABLISHED 1847.

**DANVILLE, PENNSYLVANIA.**

MANUFACTURER OF

# RAILROAD IRON,

*RAILROAD CHAIRS, SPLICE BARS AND BOLTS, FROGS, SWITCH RODS, STANDS AND LEVERS, HOOKHEAD AND COUNTERSUNK HEAD SPIKES, BRIDGE AND CAR BOLTS, ROLLS AND ROLLING MILL MACHINERY, BLAST FURNACE CASTINGS AND MACHINERY, STEAM ENGINES AND BOILERS, IRON AND BRASS CASTINGS, ENGINE AND MACHINE WORK, STEAM & WATER FITTINGS, &c., &c.*

WM. HANCOCK, President.

BENJ. J. WELCH, Sec., Treas. and Gen. Manager, Danville, Pa. | P. C. BRINCK, Vice-President, 401 Walnut St., Philadelphia.

THE

# "RED LINE!"

—RUNNING OVER THE—

**Michigan Southern and Lake Shore R. R.'s,**

—WAS THE—

FIRST LINE to CARRY FREIGHT BETWEEN the EAST and WEST,

**WITHOUT CHANGE OF CARS!**

CARS RUN THROUGH TO

# NEW YORK AND BOSTON,

IN FOUR AND FIVE DAYS!

☞ Contracts made at the Offices of the Line. ☜

C. Shutter, Agent, 247 Broadway, New York. A. Cushman, Agent, Old State House, Boston, Mass.

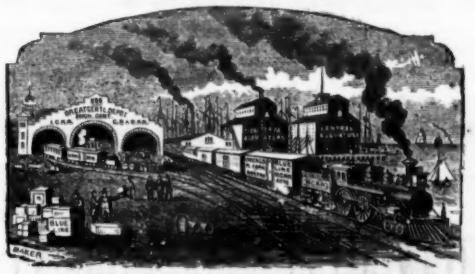
W. D. MANCHESTER, Agent, 54 Clark St., Chicago.

Great Central Route.

# "BLUE LINE."

ORGANIZED JANUARY 1, 1867.

1870.



1870.

OWNED AND OPERATED BY THE

**Michigan Central, Illinois Central, Chicago, Burlington & Quincy, Chicago & Alton, Great Western (of Canada), New York Central, Hudson River, Boston & Albany, and Providence and Worcester Railroads.**

THE "BLUE LINE" is the only route that offers to shippers of freight the advantages of an unbroken gauge through from Chicago to the Seaboard, and to all Interior Points on the line of Eastern Connections beyond Suspension Bridge and Buffalo. All Through Freight is then transported between the most distant points of the roads in interest.

## WITHOUT CHANGE OF CARS!

The immense freight equipment of all the roads in interest is employed, as occasion requires, for the through service of this Line, and has of late been largely increased. This Line is now prepared to extend facilities for the transit and delivery of all kinds of freight in Quicker Time and in Better Order than ever before.

**The Blue Line Cars**

are all of a solid, uniform build, thus largely lessening the chances of delay from the use of cars of a mixed construction, and the consequent difficulty of repairs, while remote from their own roads. The Blue Line is operated by the railroad companies who own it, without the intervention of intermediate parties between the Roads or Line and the public.

Trains run through with regularity IN FOUR OR FIVE DAYS to and from New York and Boston. Especial care given to the Safe and Quick Transport of Property Liable to Breakage or Injury, and to all **Perishable Freight.**

Claims for overcharges, loss or damage, promptly settled upon their merits. Be particular and direct all shipments to be marked and consigned via

# "BLUE LINE."

☞ *FREIGHT CONTRACTS* given at the offices of the company in Chicago, New York and Boston.

J. D. HAYES, GEN. MANAGER,...Detroit. | P. K. RANDALL,..No. 11 State St., Boston
C. E. NOBLE,....No. 8 Astor House, N. Y. | F. A. HOWE,....31 Dearborn St., Chicago
N. D. MUNSON,.....Quincy, Ill. | W. W. STREET,..31 Dearborn St., Chicago
GEO. E. JARVIS,.....273 Broadway, N. Y. | J. JOHNSON,'''.....Cairo, Ill

THOS. HOOPS, GEN. FR'T AGT. Michigan Central Railroad, Chicago.
A. WALLINGFORD, AGT. GRT. WEST'N R. R., No. 91 Lake St., Chicago.
N. A. SKINNER, Freight Agent Michigan Central Railroad.

# Empire Line!

THE EMPIRE TRANSPORTATION COMPANY'S

**Fast Freight Line to the East**

—AND—

**TO THE COAL AND OIL REGIONS,**

**Via Michigan Southern, Lake Shore, and Philadelphia & Erie R. R.'s,**

**WITHOUT TRANSFER!**

**Office, No. 72 LaSalle Street, Chicago.**

GEO. W. RISTINE, Western Superintendent, Cleveland, Ohio.
W. G. Van Demark,..265 Broadway, New York. | E. L. O'Donnell,.....Baltimore, Md
G. B. McCulloh,....42 South 5th St., Philadelphia. | Wm. F. Smith,.....Erie, Penn.
JOHN WHITTAKER, Pier 14 North River, New York.

JOSEPH STOCKTON, Agent, Chicago.

W. T. HANCOCK, Contracting Agent.
WM. F. GRIFFITTS, Jr., Gen. Freight Agent, Philadelphia.

# CHICAGO, ROCK ISLAND & PACIFIC RAILROAD.

☞ THE DIRECT ROUTE FOR

**Joliet, Morris, Ottawa, La Salle, Peru, Henry, Lacon, Peoria, Geneseo, Moline, Rock Island,**

DAVENPORT, MUSCATINE, WASHINGTON, IOWA CITY,

**Grinnell, Newton, Des Moines,**

## COUNCIL BLUFFS & OMAHA

CONNECTING WITH TRAINS ON THE UNION PACIFIC RAILROAD, FOR

**CHEYENNE, DENVER, CENTRAL CITY, OGDEN, SALT LAKE, WHITE PINE, HELENA, SACRAMENTO, SAN FRANCISCO,**

And Points in Upper and Lower California; and with Ocean Steamers at San Francisco, for all Points in **China, Japan, Sandwich Islands, Oregon and Alaska.**

☞ TRAINS LEAVE their Splendid new Depot, on VanBuren Street, Chicago, as follows:

| | LEAVE. | ARRIVE. |
|---|---|---|
| **PACIFIC EXPRESS,** (Sunday excepted) | 10.00 a. m. | 3.35 p. m |
| **PERU ACCOMMODATION,** (Sundays excepted) | 5.00 p. m. | 9.50 a. m |
| **PACIFIC EXPRESS,** (Saturdays excepted,) | 10.00 p. m. | [Mon. ex. 6.00 a. m |

**Elegant Palace Sleeping Cars run Through to Peoria & Council Bluffs WITHOUT CHANGE!**

## TICKETS TO ST. LOUIS!

FIRST CLASS, including Meals and Berths on Steamer bet. Peoria and St. Louis, - **$8.00**
SECOND CLASS, - - - - - - - - - - - - - - - **$5.50**

**AN ELEGANT PASSENGER STEAMER**

Leaves Peoria every morning for St. Louis, upon arrival of Night Express, leaving Chicago daily (Saturday excepted) at **11 00 P. M.,** from Great Rock Island Depot, head of LaSalle St., arriving in St. Louis the following morning, connecting with morning trains leaving the city, and with steamers down the River.

**Families Emigrating to Missouri or Kansas,** will find this the most desirable and cheapest Route, as through Freight Rates for household goods are much lower than all rail routes.

☞ Connections at LA SALLE, with Illinois Central Railroad, North and South; at PEORIA, with Peoria, Pekin & Jacksonville Railroad, for Pekin, Virginia, &c.; at PORT BYRON JUNCTION, for Hampton, LeClaire, and Port Byron; at ROCK ISLAND, with Packets North and South on the Mississippi River.

☞ **For Through Tickets,** and all desired information in regard to Rates, Routes, etc., call at the Company's Office, No. **37** South Clark Street Chicago.

**A. M. SMITH, Gen. Pass. Agent. HUGH RIDDLE, Gen. Supt. P. A. HALL, Asst. Gen. Supt.**

R. T. CRANE, President. C. S. CRANE, Vice-President. S. W. ADAMS, Secretary.

# THE NORTHWESTERN MANUFACTURING COMPANY,

*SUCCESSORS TO R. T. CRANE & BRO.*

MANUFACTURERS OF FIRST-CLASS

## Steam Engines

[HORIZONTAL AND UPRIGHT,]

With Tremain's Patent Balance Valve,

**Brass and Iron Goods for Steam and Gas Fitters and Engine Builders, Malleable Iron Castings, &c.**

## STEAM PUMPS, AND GENERAL MACHINERY,

**WROUGHT IRON PIPE,**

CONSTRUCTORS OF R. T. CRANE'S

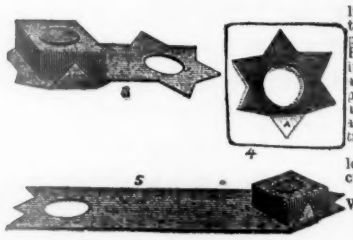
## PATENT STEAM WARMING & VENTILATING APPARATUS,

Perfected, Simplified and adapted to Dwellings, School-houses, Churches, &c., &c.

**Jefferson St., between Lake and Randolph, Chicago.**

OFFICE: 100 WASHINGTON ST.

## THE UNION PATENT STOP WASHER,




Manufactured at Coatesville, Chester Co., Pa., on the line of the Pennsylvania Central R. R., has now stood the test of practical use on the above road, the Philadelphia, Wilmington & Baltimore and Philadelphia & Reading Railroads, for the past two years, and proved itself to be what is claimed for it—a perfect security against the unscrowing or receding of nuts. Its simplicity, efficiency and cheapness over any other appliance for the purpose should recommend it to the attention of all persons having charge of Railroad tracks, cars and machinery.

It is especially adapted to, and extensively used by leading Railroads of the country for the purpose of securing nuts on railway joints.

The accompanying cuts show the application of the Washer. For further information, apply to

**A. GIBBONS, Coatesville, Pa.**

# TO RAILWAY MANAGERS!

Consult the interests of your Company, by purchasing PIERCE'S ELASTIC RENEWABLE RAILWAY FROG AND CROSSING. The cheapest, best and most durable yet introduced. Examine the cuts and specifications, for particulars. All Frogs and Crossings of this device warranted to give satisfaction. Orders promptly filled. Address as below. Specifications of

## PIERCE'S ELASTIC

**RENEWABLE**

## Railway Frog and Crossing.

FIG. 3

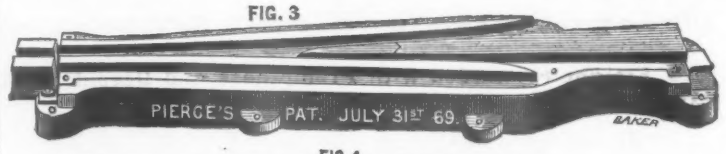



FIG 1

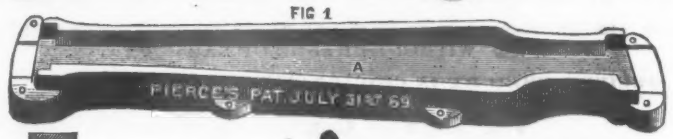



FIG.2

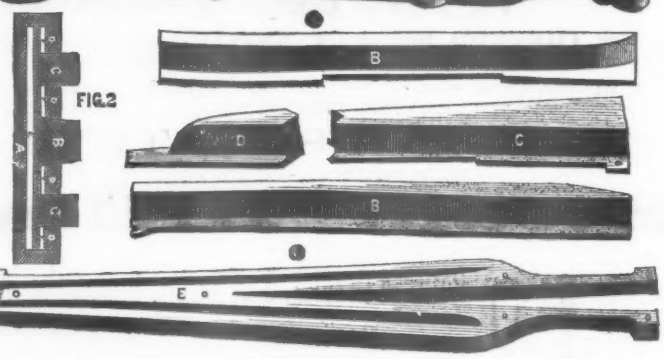



FIG. 1.—A. Permanent Bed Plate, Cast Iron.
B.B. Guard Rails, Cast Iron, wearing surface chilled, (can be made of steel if preferred.)
C. Base of point, Cast Iron, with chilled surface, or Steel.
D. Point, of Cast Steel.
E. Cap, of either Cast or Wrought Iron.

FIG. 2.—Cross Section. A. Bed Plate. B. Base. C.C. Guard Rails. D.D.D.D. Cap. E. Wood packing half-inch thick. F.F.F.F. Wood packing, quarter-inch thick.

FIG. 3.—Shows the Frog complete, with all its parts adjusted ready for laying down.

**THE ADVANTAGES** claimed for this Frog are in brief: FIRST—The permanency of the bed plate, on which there is no wear. SECOND—The durability of the Guard Rails, base and point, and the ease with which they can be renewed. Also, the elasticity which is given by the packing, avoiding the rigidity of the Solid Frog. THIRD—The bed plate being once in position, does not require to be taken up to produce a new Frog, as the wearing surfaces (Guard-rails, base and point) are renewable at pleasure. FOURTH—The Cap E is adjustable and easily removed for the purpose of renewing any of the worn parts, and can be done in ten minutes time by two men. The Guard-rails, point and base, being held in position and fastened by the Cap. By this device a new Frog is produced at about one-third the original cost. FIFTH—It is not necessary to take up or move the connecting rails with the Frog for the purpose of renewal. It does away with the interruption to passing trains and the labor incident to replacing the old form of Frogs. Many other points of excellence and economy might be adduced which it is not deemed necessary to enumerate, believing that a practical examination or test by Railroad Managers will bring out its qualities and prove its usefulness.

## PRICE LIST.

[POINT OF CAST STEEL, BASE AND GUARD RAILS OF CHILLED IRON SURFACE.]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **No. 1.—6** | **Foot** | **Frog** | **about** | **7** | **degrees,** | **$85.00** | Base, $8 each. Point, $10 each. |
| " 2.—5½ | " | " | " | 8 | " | $85.00 | Guard Rail, $3 each, or Full Set, $30. |
| " 3.—5 | " | " | " | 9 | " | $82.00 | |

☞ Other sizes that may be desired, or renewable parts of Cast Steel, furnished at proportionate rates.

**SHERMAN, MARSH & STEEL, Manufacturers and General Agents,**

**OFFICE, 91 WASHINGTON ST.,**

CHICAGO, ILLINOIS.

## OMNIBUSES

—OF—

## EVERY STYLE!

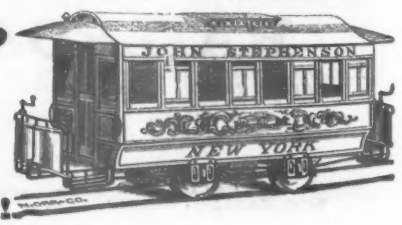
☞ Orders Promptly Filled. ☜

## CARS,

**LIGHT, STRONG**

—AND—

## ELEGANT!



# CHICAGO & NORTHWESTERN R. W.

**Comprising the PRINCIPAL RAILROADS from CHICAGO Directly NORTH NORTH-WEST and WEST.**

## ALL RAIL TO TH PACIFIC OCEAN!

## Great California Line.

TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

| | |
|---|---|
| **8:15 A. M. Cedar Rapids Pass** | **11:00 P. M. Night Mail.** |
| **10:45 A. M. Pacific Express.** | **11:00 P. M. R. Island Pass.** |
| **10:45 A. M. Rock Island Exp.** | **4:00 P. M. Dixon Passenger.** |

For Fulton, Clinton, Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

## UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

| FROM CHICAGO | Hours. | 1st Class Fare. | FROM CHICAGO | Days. | 1st Class Fare. |
|---|---|---|---|---|---|
| **To OMAHA,.....** | **23** | **$20.00** | **To SACRAMENTO,.** | **4½** | **$118.00** |
| **" DENVER,.....** | **52** | **70.75** | **" SAN FRANCISCO,** | **5** | **118.00** |

TRAINS ARRIVE:—Night Mail, **7.00** a. m.; Dixon Passenger, **11.10** a. m.; Pacific Express, **3:25** p. m.; Rock Island Express, **3:25** p. m.; Cedar Rapids Passenger, **6:50** p. m.

## FREEPORT LINE.

**9.00 A. M. & 9.45 P. M.** For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.

**4.00 P. M., Rockford Accommodation.**
**5.30 P. M., Geneva and Elgin Accommodation**
**6.10 P. M., Lombard Accommodation.**

**TRAINS ARRIVE:**—Freeport Passenger, **2:30** a. m.,**3:00** p. m.; Rockford Accommodatio 11:05 a. m.; Geneva and Elgin Accommodation, **8:45** a. m.; Lombard Accommodation, **6:50** a. m.

## WISCONSIN DIVISION.

☞ Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:

**10.00 A. M. DAY EXPRESS,** for Janesville, Monroe, Whitewater, Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.

**3.00 P. M., Janesville Accommodation.**

**5.00 P. M. NIGHT EXPRESS,** for Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Menasha, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.

**5.30 P. M., Woodstock Accommodation.**

**TRAINS ARRIVE:**—5:30 a. m., **9:00** a. m., **2:00** p. m. and **7:15** p. m.

## MILWAUKEE DIVISION.

**9.45 A. M. & 5.00 P. M. EXPRESS,** (except Sunday,) for Waukegan, Kenosha, Racine and Milwaukee.

| | |
|---|---|
| **MILWAUKEE ACCOMMODATION,** with Sleeping Car attached | **11:00 P. M.** |
| **EVANSTON ACCOMMODATION,** (Daily,) from Wisconsin Div. Depot | **1:30 P. M.** |
| **KENOSHA ACCOMMODATION,** (Sundays excepted) from Wells St. Depot | **4:15 P. M.** |
| **AFTERNOON PASSENGER,** from Milwaukee Div. Depot | **5:00 P. M.** |
| **WAUKEGAN ACCOMMODATION,** (except Sundays) from Wells St. Depot | **5:25 P. M.** |
| **WAUKEGAN PASSENGER,** (Sundays excepted) from Wells St. Depot | **6:10 P. M.** |

**TRAINS ARRIVE:**—Night Accommodation, with Sleeping Car, **5:45** a. m.; Day Express, **10:45** a. m. and **7:30** p. m.; Waukegan Accommodation, **8:40** a. m.; Kenosha Accommodation, **9:10** a. m.; Evanston Accommodation, **4:00** p. m.; Waukegan Passenger, **8:10** a. m.

## PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

**THROUGH TICKETS** Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

**H. P. STANWOOD,** Gen. Ticket Agt. **JNO. P. HORTON,** N. W. Pass. Agt. **GEO. L. DUNLAP,** Gen'l Supt.

# Western Union Railroad.

CHICAGO & NORTHWESTERN DEPOT, CHICAGO. | MILWAUKEE & CHICAGO DEPOT, MILWAUKEE.

## THE DIRECT ROUTE!

CHICAGO, RACINE & MILWAUKEE,

—TO—

**Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point, Madison, Freeport, Fulton, Lyons, Rock Island, Sabula, Galena, Dubuque, Des Moines, Council Bluffs,**

OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

**FRED. WILD,** Gen. Ticket Agent. **D. A. OLIN,** Gen. Superintendent.

## CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

## Railroad Supplies!

—AND—

**CONTRACTORS' MATERIAL.**

**11 and 13 Wells Street,**

**CHICAGO, ILL.**

Manufacturers of IMPROVED HEAD-LIGHTS for Locomotives, Hand and Signal Lanterns, Car and Station Lamps, Brass Dome Casings, Dome Mouldings, Cylinder Heads, and Car Trimmings, of Every Description.

# Pan-Handle

—AND—

# Penn'a Central Route East!

☞ SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO ☜

## PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Saturday, JANUARY 1st, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

**6:45 A. M.** NEW YORK EXPRESS. [SUNDAYS EXCEPTED.] Arriving at

| | | | | | |
|---|---|---|---|---|---|
| COLUMBUS.....8:55 P. M. | HARRISBURG...2.30 P. M. | NEW YORK....10:26 P. M. | WASHINGTON | | |
| PITTSBURGH....4:47 A. M. | PHILADELPHIA 7:00 P. M. | BALTIMORE.... 7:00 P. M. | CITY.....10:00 P. M. | | |

**7:45 P. M.** NIGHT EXPRESS. [SATURDAYS EXCEPTED.] Arriving at:

| | | | | | |
|---|---|---|---|---|---|
| COLUMBUS.. .11:10 A. M. | HARRISBURG. 5:20 A. M. | NEW YORK....12:05 P. M. | WASHINGTON. 1:00 P. M. | | |
| PITTSBURGH.. 7:05 P. M. | PHILADELPHIA.9.40 A. M. | BALTIMORE... 9:00 A. M. | BOSTON.....11:50 P. M. | | |

**Woodruff's Palace Day and Sleeping Cars**

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

## ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

TRY THE NEW ROUTE. FARE AS LOW AS BY OTHER LINES.

## CINCINNATI & LOUISVILLE AIR LINE SOUTH.

**42 Miles the Shortest Route to Cincinnati,**
**18 Miles the Shortest Route to Indianapolis and Louisville.**

—FROM ONE TO—

**2 Hours the Quickest Route to Cincinnati!**

THE SHORTEST AND BEST ROUTE TO

**Columbus, Chillicothe, Hamilton, Wheeling, Parkersburg, Evansville, Dayton, Zanesville, Marietta, Lexington, Terre Haute, Nashville,**

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

— QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO —

**New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,**

**AND ALL POINTS SOUTH.**

Cincinnati, Indianapolis and Louisville Trains run as follows:

*THROUGH WITHOUT CHANGE OF CARS!*

| **6:45 A. M.** (Sundays excepted) Arriving at | | **7:45 P. M.** (Saturdays excepted.) Arriving at | |
|---|---|---|---|
| LOGANSPORT | 12:10 P. M. | LOGANSPORT | 1:30 A. M. |
| KOKOMO | 1:40 P. M. | KOKOMO | 2:40 A. M. |
| CINCINNATI | 9:40 P. M. | CINCINNATI | 10:00 A. M. |
| INDIANAPOLIS | 4:30 P. M. | INDIANAPOLIS | 6:00 A. M. |
| LOUISVILLE | 11:30 A. M. | LOUISVILLE | 3:20 P. M. |

**Lansing Accommodation: Leaves 3:45 P. M. Arrives 9:15 A. M.**

## PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

☞ Ask for Tickets **via COLUMBUS** for the East, **via HAGERSTOWN** for Cincinnati, and **via KOKOMO** for Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at **95 RANDOLPH STREET, CHICAGO,** and at Principal Ticket Offices in the West and Northwest.

**WM. L. O'BRIEN,** Gen. Pass. and Ticket Agent, Columbus. **I. S. HODSDON,** Northwestern Pass. Agt., Chicago.

# KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route!

—TO—

## COLORADO, NEW MEXICO, ARIZONA, UTAH,

Montana, Nevada, California and Northern States of Old Mexico.

COMPLETED THROUGH KANSAS, TO

**Carson, Colorado, 487 Miles West of Kansas City and Leavenworth.**

Close Connections are made with Express Trains of the HANNIBAL & ST. JOSEPH and NORTH MISSOURI RAILROADS, at KANSAS CITY, and with MISSOURI PACIFIC RAILROAD at STATE LINE.

DAILY EXPRESS TRAINS are run between

KANSAS CITY, LEAVENWORTH, LAWRENCE,

Topeka, Wamego, Manhattan, Junction City, Salina, Brookville,

**HARKER, HAYS and CARSON.**

**Pullman's Sleeping Cars Attached to Night Express Trains!**

**Passenger Time from Kansas City to Denver, Less than 50 Hours.**

Hughes & Co.'s Four-Horse Concord Coaches leave Carson daily for Denver, Central City, Georgetown, &c.

Southern Overland Passenger Express and Mail Coaches leave Carson daily for Fort Lyon, Pueblo, Trinidad, Fort Union, Las Vegas, Santa Fe, &c.

**Ask for Through Tickets via Kansas Pacific Railway, "Smoky Hill Route."** Freight and Passage Rates as Low and Time as Quick as by any other Route.

**R. B. GEMMELL,** Gen. Ticket Agent. **A. ANDERSON,** Gen. Supt.

THE FAVORITE THROUGH PASSENGER ROUTE!

# Chicago, Burlington & Quincy

**RAILROAD. AND CONNECTIONS.**

## 3 THROUGH EXPRESS TRAINS DAILY.

| FROM CHICAGO | Hours. | 1st Class Fare. | FROM CHICAGO | Days. | 1st Class Fare. |
|---|---|---|---|---|---|
| To OMAHA, - - | 23 | $20.00 | To DENVER, - - | 2¼ | $70.75 |
| " ST. JOSEPH, - | 21 | 19.50 | " SACRAMENTO, | 4½ | 118.00 |
| " KANSAS CITY, - | 22 | 20.00 | " SAN FRANCISCO, | 5 | 118.00 |

TRAINS LEAVE CHICAGO from the Great Central Depot, foot of Lake Street, as follows:

### BURLINGTON, KEOKUK, COUNCIL BLUFFS AND OMAHA.

**7:40 A. M.** **MAIL AND EXPRESS,** (Daily except Sunday,) stopping at all stations between Chicago and Burlington; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &c., &c.

**10:45 A. M.** **PACIFIC EXPRESS,** (Daily except Sunday,) stopping only at Riverside, Hinsdale, Aurora, Leland, Mendota, Princeton, Rock Island Crossing, Buda, Kewanee, Galva, Galesburg, and Monmouth, between Chicago and Burlington. **PULLMAN PALACE DRAWING ROOM CAR** attached to this train daily from Chicago

### TO COUNCIL BLUFFS AND OMAHA, WITHOUT CHANGE!

**11:30 P. M.** **NIGHT EXPRESS,** (Daily, except Saturday,) stopping at all principal stations between Chicago and Burlington. ELEGANT DAY COACHES, and a **PULLMAN PALACE SLEEPING CAR** are attached to this train from **Chicago to Burlington, without change!** This is the only Route between

### CHICAGO, COUNCIL BLUFFS & OMAHA,

— RUNNING THE CELEBRATED —

Pullman Palace Dining Cars!

The Shortest, Best, Quickest and only Route between

**CHICAGO & KEOKUK,**

*Without Ferrying the Mississippi River!*

### QUINCY, ST. JOSEPH, LEAVENWORTH AND KANSAS CITY.

**10:45 A. M.** **PACIFIC EXPRESS,** (Daily, except Sunday,) with PALACE COACH attached, running through from Chicago to KANSAS CITY, **Without Change!**

**5:00 P. M.** **EVENING EXPRESS,** (Daily, except Sunday,) with **Pullman Palace Drawing Room Sleeping Car** attached, running through from Chicago to QUINCY, WITHOUT CHANGE!

**11:30 P. M.** **NIGHT EXPRESS** (Daily, except Saturday,) with **Pullman Palace Sleeping Car** attached from Chicago to GALESBURG; PALACE DAY COACHES from Chicago to QUINCY, **Without Change!**

☞ This is the Shortest, Quickest and only Route between ☜

### CHICAGO AND KANSAS CITY,

*WITHOUT CHANGE OF CARS OR FERRY.*

THE SHORTEST, BEST AND QUICKEST ROUTE BETWEEN CHICAGO AND

### St. Joseph, Atchison, Weston, Leavenworth,

AND ALL POINTS ON THE KANSAS PACIFIC R'Y.

**Local Trains Leave** { RIVERSIDE & HINSDALE ACCOMMODATION, 7:00 A. M. 1:30 & 6:15 P. M.
MENDOTA PASSENGER, ..... 4:15 P. M.
AURORA PASSENGER, ..... 5:30 P. M.

**Trains Arrive:**—Mail and Express, 3:45 p. m.; Atlantic Exp., 4:15 p. m., except Sunday; Night Exp, 9:40 a. m., except Monday; Mendota Passenger, 10:10 a. m.; Aurora Passenger, 8:15 a. m.; Quincy Passenger 7:30 P. M.; Riverside and Hinsdale Accommodation, 6:50 and 9 a. m and 5:30 p. m., except Sunday.

**Ask for Tickets via Chicago, Burlington & Quincy Railroad,** which can be obtained at all principal offices of connecting roads, and at Company's office in Great Central Depot, Chicago, at as low rates as by any other route.

**ROB'T HARRIS,** Gen'l Superintendent, CHICAGO.
**SAM'L POWELL,** Gen'l Ticket Agent, CHICAGO.
**E. A. PARKER,** Gen. West. Pass. Agt., CHICAGO.

---

☞ **PASSENGERS GOING WEST!** ☜

To Missouri, Kansas, Nebraska, Colorado or New Mexico, Should Buy Tickets via the Short Route

# HANNIBAL & ST. JOSEPH R. R. LINE,

Three Express Trains from Quincy or Macon to St. Joseph,

—ALSO DIRECT—

## To Kansas City

☞ WITHOUT CHANGE OF CARS! ☜

CONNECTIONS ARE CLOSE AND DIRECT FOR

### ATCHISON, WESTON & LEAVENWORTH.

CONNECTIONS:

**AT KANSAS CITY,** with Kansas Pacific Railway, for Lawrence, Ottawa, Topeka, Fort Riley Junction City, Fort Hays, Sheridan, &c.
**AT KANSAS CITY,** with Kansas City, Fort Scott, and Galveston Railroad, for Fort Scott, Fort Gibson, Galveston, &c.
**AT ST. JOSEPH,** with St. Joseph & Council Bluffs Railroad, ALL RAIL from St. Joseph to

### Nebraska City, Council Bluffs & Omaha.

**AT OMAHA,** with Nebraska Union Pacific Railroad, for Fort Kearney, Julesburg, Cheyenne, Laramie, Benton, &c.
**AT COUNCIL BLUFFS,** for Sioux City, all Rail.

☞ By this Line, passengers have choice of Overland Routes, either via Smoky Hill or Platte Route To Denver, Central City, Salt Lake, Sacramento, California and all points in the Mining Regions.

Daily Overland Coaches via Smoky Hill Route leave Sheridan, end of U. P. R. R., for Santa Fe and New Mexico

**Through Tickets for Sale at all Ticket Offices.**

**P. B. GROAT, Gen. Ticket Agent.** **GEO. H. NETTLETON, Gen. Supt.**
**HENRY STARRING, Gen. Agent, Chicago.**

---

Old, Reliable, Air-Line Route!

# CHICAGO, ALTON & ST. LOUIS R. R.

*SHORTEST, QUICKEST AND ONLY DIRECT ROAD TO*

## Bloomington, Springfield, Jacksonville, Alton,

— AND —

## ST. LOUIS!

WITHOUT CHANGE OF CARS.

THE ONLY ROAD MAKING IMMEDIATE CONNECTIONS AT ST. LOUIS, WITH MORNING AND EVENING TRAINS

—FOR—

## ATCHISON, LEAVENWORTH, KANSAS CITY,

**Lawrence, Topeka, Memphis, New Orleans,**

And All Points South and Southwest.

☞ TRAINS leave CHICAGO from the West-side Union Depot, near Madison Street Bridge. ☜

| | |
|---|---|
| **EXPRESS MAIL,** [Except Sundays] | 10:00 A. M. |
| **LIGHTNING EXPRESS,** [Except Saturdays and Sundays] | 11:00 P. M. |
| **NIGHT EXPRESS,** [Except Saturdays] | 7:05 P. M. |
| **JOLIET ACCOMMODATION,** [Except Sundays] | 4:00 P. M. |
| **JACKSONVILLE EXPRESS,** [Daily] | 7:10 P. M. |

Trains arrive at Chicago at 8.10 P. M., 7.10 A. M. and 12:45 P. M. Joliet Accom., 9.45 A. M.

**This is the ONLY LINE Between CHICAGO & ST. LOUIS RUNNING**

Pullman's Palace Sleeping and Celebrated Dining Cars!

BAGGAGE CHECKED THROUGH.

**Through Tickets** can be had at the Company's office, No. 55 Dearborn street, Chicago, or at the Depot, corner of West Madison and Canal streets, and at all principal Ticket Offices in the United States and Canada. Rates of Fare and Freights as low as by any other Route.

**A. NEWMAN, Gen. Pass. Agent.** **J. C. McMULLIN, Gen. Supt.**

---

# North Missouri R. R.

PASSENGERS FOR

## KANSAS AND THE WEST,

ARE REMINDED THAT

**THE NORTH MISSOURI R. R.**

— IS —

**11 MILES SHORTER than any other Route!**

BETWEEN

St. Louis and Kansas City.

**15 Miles Shorter between ST. LOUIS and LEAVENWORTH**

— AND —

**49 MILES SHORTER TO ST. JOSEPH!**

THAN ANY OTHER LINE OUT OF ST. LOUIS.

☞ **Three Through Express Trains Daily!** ☜

Pullman's Celebrated Palace Sleeping Cars on all Night Trains!

☞ **FOR TICKETS,** apply at all Railroad Ticket Offices, and see that you get your Tickets via St. Louis and North Missouri Railroad.

**C. N. PRATT,** Gen. East'n Agt., 111 Dearborn st. CHICAGO.
**J. M. DAVIES,** General Passenger Agent, ST. LOUIS.
**S. H. KNIGHT,** General Superintendent, ST. LOUIS.

---

# Pacific Railroad of Missouri.

THE MOST DIRECT AND RELIABLE ROUTE FROM ST. LOUIS THROUGH TO

## KANSAS CITY, LEAVENWORTH & ATCHISON,

☞ WITHOUT CHANGE OF CARS! ☜

**Close Connections at KANSAS CITY with Missouri Valley, Missouri River, Ft. Scott & Gulf, and Kansas Pacific R'ys, for Weston, St. Joseph, Junction City, Fort Scott, Lawrence, Topeka, Sheridan, Denver, Fort Union, Santa Fe, and**

## ALL POINTS WEST!

☞ At SEDALIA, WARRENSBURG and PLEASANT HILL, with Stage Lines for Warsaw, Quincy, Bolivar, Springfield, Clinton, Osceola, Lamar, Carthage, Granby, Neosho, Baxter Springs, Fort Gibson, Fort Smith, Van Buren, Fayetteville, Bentonville.

**PALACE SLEEPING CARS on all NIGHT TRAINS.**

**Baggage Checked Through Free!**

THROUGH TICKETS for sale at all the Principal Railroad Offices in the United States and Canadas. **Be Sure and Get your Tickets over the PACIFIC R. R. OF MISSOURI.**

**W. B. HALE,** Gen. Pass. and Ticket Agt.
**THOS. McKISSOCK,** General Superintendent.

# Sixty-One Miles the Shortest Line! Only Thirty Hours!

— FROM —

## CHICAGO TO NEW YORK.

## Pittsburgh, Ft. Wayne & Chicago and Pennsylvania Central

IS THE ONLY ROUTE RUNNING ITS ENTIRE TRAIN THROUGH TO PHILADELPHIA AND NEW YORK, AND THE ONLY ROUTE RUNNING

THREE DAILY LINES OF PULLMAN'S DAY AND SLEEPING PALACES,

— FROM CHICAGO TO —

## PITTSBURGH, HARRISBURG, PHILADELPHIA & NEW YORK,

☞ WITHOUT CHANGE! ☜

WITH BUT ONE CHANGE TO

**BALTIMORE, PROVIDENCE, NEW HAVEN,**

HARTFORD, SPRINGFIELD, WORCESTER AND BOSTON!

And the Most Direct Route to Washington City.

☞ Trains Leave WEST SIDE UNION DEPOT, corner West Madison and Canal Streets, as follows:

| LEAVE: | Mail | Fast Express. | Pacific Exp. | Night Exp. | VALPARAISO ACCOMMODATION. Leaves CHICAGO daily, (except Sunday,) at 4.50 P. M. |
|---|---|---|---|---|---|
| CHICAGO | 6.40 A. M. | 11.00 A. M. | 5.15 P. M. | 9.00 P. M. | |
| PLYMOUTH | 10.46 " | 2 00 P. M. | s. 9 10 " | 2.13 A. M. | |
| FORT WAYNE | 2.00 P. M. | 3.55 " | 11.30 " | n. 5.30 " | |
| LIMA | 4.34 " | 5.30 " | 1.35 A. M. | 8.10 " | |
| FOREST | 5.40 " | 6.38 " | 2 48 " | 9 40 " | |
| CRESTLINE | 6.00 A. M. | s. 8.00 " | 4.30 " | D.12.05 P. M. | |
| MANSFIELD | 6.42 " | 8 25 " | 5.00 " | 12.34 " | |
| ORRVILLE | 9.05 " | 10 00 " | 6.45 " | 2.37 " | |
| ALLIANCE | 11 15 " | 11.20 " | n. 8.40 " | 3.55 " | |
| ROCHESTER | D. 3 05 P. M. | 1.15 A. M. | 10.52 " | 6.02 " | |
| PITTSBURGH | 4 00 " | 2.50 " | 12.45 P. M. | s. 7.50 " | 5.30 A. M. |
| BLAIRSVILLE BRANCH | 6.05 " | 4.34 " | 2.49 " | 9.54 " | 7.23 " |
| JOHNSTOWN | 6.56 " | 5.18 " | 3.37 " | 10.43 " | 8.08 " |
| CRESSON | 7.58 " | 6.04 " | 4.38 " | 11.43 " | 9.04 " |
| ALTOONA | s. 9.05 " | n. 7.00 " | s. 5.45 " | 12.35 A. M. | n.10.05 " |
| HUNTINGDON | 10.21 " | 8.06 " | 7.04 " | 1.45 " | 11.14 " |
| LEWISTOWN | 11.44 " | 9.10 " | 8.23 " | 2.59 " | 12.25 P. M. |
| HARRISBURG | 2.10 A. M. | 11.12 " | 10.45 " | 5.20 " | D. 2.50 " |
| LANCASTER | 3.40 " | 12.27 P. M. | 12.15 A. M. | 7.00 " | 4.10 " |
| DOWNINGTON | 5.00 " | 1.37 " | 1.40 " | n. 8.16 " | 5.35 " |
| **ARRIVE:** | | | | | |
| PHILADELPHIA | 6.30 " | 2.45 " | 3.10 " | 9.40 " | 7.00 " |
| NEW YORK, VIA PHILADELPHIA | 10.41 " | 6.00 " | 6.43 " | 1.00 P. M. | 10.26 " |
| NEW YORK, VIA ALLENTOWN | ... ..... | 6.00 " | ..... | 12.05 P. M. | ..... |
| BALTIMORE | ..... | 2.45 " | 4.20 " | 9.00 A. M. | 7.00 " |
| WASHINGTON | ..... | 6.20 " | 5.50 " | 1.00 P. M. | 10.00 " |
| BOSTON | 9.00 P. M. | 5.50 A. M. | 5.05 P. M. | 11.50 " | ..... |

**THE FAST EXPRESS** Leaves Chicago daily, except Sunday; the entire Train,—Baggage, Day and Palace Cars—RUNNING THROUGH from Chicago to New York, via Mantua Junction; leaves Pittsburgh daily, except Sunday; has SLEEPING CAR from Crestline to Altoona, except Saturday. This train **reaches NEW YORK one hour in advance of all other Lines, and in time to make close connection for BOSTON!** No other Route through New York makes it! Arrives in BALTIMORE **Five Hours,** and WASHINGTON **Four Hours in Advance of Rival Routes!**

**THE PACIFIC EXPRESS** Leaves Chicago and Pittsburgh daily, for Philadelphia and New York, with PULLMAN PALACE CARS from Chicago; leaves Harrisburg for Baltimore daily, except Sunday; has SLEEPING CARS from Chicago to Pittsburgh, and from Altoona to Philadelphia. This train arrives in BALTIMORE **Nine Hours,** and WASHINGTON **Seven Hours, in Advance of all other Lines!**

**THE NIGHT EXPRESS** Leaves Chicago daily, except Saturday and Sunday; leaves Pittsburgh daily, except Sunday; leaves Harrisburg for Baltimore daily; has SILVER PALACE CARS on Tuesday, Wednesday and Friday; COMPARTMENT CAR on Monday and Thursday from Chicago to Philadelphia and New York; has SLEEPING CARS from Chicago to Crestline, and from Pittsburgh to New York, Philadelphia and Baltimore. This train reaches BALTIMORE **Three Hours in Advance of competing Routes!**

**THE MAIL** Leaves Chicago daily, except Sunday, stopping at all Stations, and reaching Crestline the same evening [where passengers can transfer to Day Express]; leaves Crestline [Express,] the next morning, and leaves Pittsburgh daily, except Sunday. SLEEPING CARS from Pittsburgh to Philadelphia.

**THE SOUTHERN EXPRESS** Leaves PITTSBURGH daily, except Monday, with SILVER PALACE CARS to Philadelphia and New York; leaves Harrisburg for Baltimore daily, except Sunday.

**BOSTON AND NEW ENGLAND PASSENGERS will find this Route especially Desirable, as it Gives them an opportunity of Seeing the FINEST VIEWS AMONG THE ALLEGHANY MOUNTAINS,**

Besides Visiting PITTSBURGH, PHILADELPHIA and NEW YORK, without extra cost!

All New England Passengers holding Through Tickets, will be Transferred, with their Baggage, to Rail and Boat Connections in NEW YORK, WITHOUT CHARGE.

## Close Connections Made at Lima for all Points on the Dayton & Mich. and Cin., Hamilton & Dayton R'ys,

**And at CRESTLINE, for CLEVELAND, ERIE, DUNKIRK, BUFFALO, NIAGARA FALLS, and all Points reached via Lake Shore R.R.**

THROUGH TICKETS FOR SALE AT THE COMPANY'S OFFICES, N.W. COR. RANDOLPH & LA SALLE ST.,

65 and 52 Clark St., Cor. Randolph and Wells St., (under the Briggs House,) and at Depot, Chicago; also at Principal Ticket Offices in the West.

F. R. MYERS, Gen. Pass. and Ticket Agt, P. & F. W. R'y, Chicago. W. C. CLELAND, Gen. Western Pass. Agt, P. Ft. W. & C. R'y, Chicago.

T. L. KIMBALL, Gen. Western Pass. Agent, Penn. Central R. R., Chicago.



## WHAT IS SAID OF THE RAILROAD GAZETTE.

"A very neat publication in point of appearance, and, as it always has been, is now a reliable, interesting and accurate journal, ably edited in its various departments. * * * Our scissors have wandered over its columns "many a time and oft," and always with gratifying results."—*Buffalo Commercial Advertiser.*

"The news is very full, the discussions are conducted in good temper and with excellent information. To judge from this first number, the conductors of the GAZETTE know what "railroading" is, and what a proper weekly journal should be."—*New York World.*

"One of our most valuable exchanges. * * * Its columns teem with reliable information of great benefit to railroad men of every section of the United States."—*Leavenworth Bulletin.*

"Full of information, scientific and general, with regard to railroads all over the country, their construction, operation, etc."—*Rochester Chronicle.*

"For railroad men and others wishing to keep themselves thoroughly posted on railroad matters we know of no better paper."—*Madison State Journal.*

"A most valuable thing to the engineer and all railway men, the capitalist, traveler, mechanic and general reader."—*Brooklyn (N. Y.) Argus.*

"As it devotes much attention to Southern railroad and industrial interests, it is always interesting to Southern readers."—*Galveston News.*

"Has always been one of the best papers of the country for railroad intelligence."—*New York Commercial and Financial Chronicle.*

"In every respect a worthy representative of the energetic and go ahead city where it is published."—*Cincinnati Railroad Record.*

"Of great interest to railroad men, and almost equally so to those who use railroads."—*Marshall (Mich.) Statesman.*

"Makes a very handsome appearance and is full of valuable matter."—*Chicago Evening Post.*

"Every man who is at all interested in railroads would do well to take the GAZETTE."—*Jacksonville (Ill.) Independent.*

"It appears to be in many features the best journal of its class now extant."—*New York Official Railway News.*

"An impartial and independent journal, valuable to every railroad man."—*Parkersburg (W. Va.) Times.*

"It must prove a very valuable paper to stockholders and those who are interested in railroads."—*New York Globe.*

"Unquestionably the best railroad journal in the United States.—*Waukegan (Ill.) Patriot.*

"The best informed railway newspaper published in the West."—*Aurora (Ill.) Beacon.*

"A well-edited paper, showing industry and intelligence."—*American Railway Times.*

"Well worthy the patronage of all intelligent railroad men."—*Kalamazoo Gazette.*

"Replete with matters connected with railroading."—*Holmesburg (Pa.) Gazette.*

"We regard it as the best railroad paper out."—*Peoria National Democrat.*

"Equal in appearance to any technical journal of America."—*Atchison Patriot.*

"Every railroad man reads the GAZETTE."—*Bloomington (Ill.) Leader.*

"A complete repository of railroad news."—*Harrisburg (Pa.) Patriot.*

"The best journal of its class in the United States."—*LaCrosse Leader.*

"Promising much for the future."—*Detroit Commercial Advertiser.*

"A model of what a railroad newspaper should be."—*Chicago Tribune.*

"An excellent journal for railroad men."—*Mankato (Minn.) Record.*

"Of great interest to railroad men."—*Delaware (O.) Gazette.*



# Broad Gauge! Double Track!

## ERIE RAILWAY.

**4 EXPRESS TRAINS DAILY!**

From Cleveland, Dunkirk and Buffalo, 625 Miles, to New York, WITHOUT CHANGE of Coaches!

☞ The Trains of this Railway are run in DIRECT CONNECTION WITH ALL WESTERN AND SOUTHERN LINES, for

**Elmira, Williamsport, Oswego, Great Bend, Scranton, Newburgh,**

## NEW YORK, ALBANY, BOSTON, PROVIDENCE,

AND PRINCIPAL NEW ENGLAND CITIES.

**New and Improved DRAWING ROOM COACHES are attached to the DAY EXPRESS Running THROUGH TO NEW YORK.**

☞ **SLEEPING COACHES,** Combining all Modern Improvements, with perfect Ventilation and the peculiar arrangements for the comfort of Passengers incident to the **BROAD GAUGE,** accompany all night trains to New York.

**CONNECTIONS CERTAIN!** as Trains on this Railway will, when necessary, **wait from one to two hours for Western trains.**

All Trains of Saturday run directly Through to New York.

☞ **Ask for Tickets via Erie Railway,** which can be procured at **66 Clark Street,** Chicago, and at all Principal Ticket offices in the West and Southwest.

**L. D. RUCKER,** Gen'l Superintendent, New York. | **A. J. DAY,** Western Passenger Agent, Chicago. | **WM. R. BARR,** Gen'l Passenger Agent, New York.

# LAKE SHORE
—AND—
# MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN

## CHICAGO, BUFFALO & NEW YORK,

WITHOUT CHANGE!

AND THE ONLY RAILWAY

RUNNING PALACE COACHES THROUGH!

—BETWEEN—

## CHICAGO & NEW YORK, via BUFFALO

☞ WITHOUT TRANSFER OF PASSENGERS! ☜

**All Trains Stop at Twenty-Second Street to Take and Leave Passengers. Baggage Checked at that Station for all Points East.**

**4 EXPRESS TRAINS DAILY,** [Sundays Excepted,] Leave Chicago from the New Depot, on Van Buren St., at the head of La Salle Street, as follows:

**7:30 A. M.** MAIL TRAIN.
VIA OLD ROAD. SUNDAYS EXCEPTED.

**Leaves** 22d Street 7:45 A. M. Stops at all Stations. **Arrives**—Toledo, 6:20 P. M.

**11:00 A. M.** SPECIAL NEW YORK EXPRESS,
VIA AIR LINE. SUNDAYS EXCEPTED.

**Leaves**—Twenty-Second Street, **11:15 A. M.** **Arrives**—Elkhart, 2:55 P. M.; Cleveland 10:30 P. M.; Buffalo, 4:10 A. M.; New York, 6:55 P. M.; Boston, 11:45 P. M.

**This Train has PALACE SLEEPING COACH Attached, Running**

**THROUGH TO ROCHESTER, WITHOUT CHANGE!**

**IN DIRECT CONNECTION WITH**

**Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.**

**5:15 P. M.** ATLANTIC EXPRESS (Daily),
VIA AIR LINE.

**Leave**—Twenty-Second Street **5:30 P. M.** **Arrives**—Laporte, 8:10 P. M. (Stops 20 minutes for Supper); arrives at Toledo, 2:50 A. M.; Cleveland, 7:25 A. M. (20 minutes for Breakfast); arrives at Buffalo, 1:55 P. M.; Rochester, 5:10 P. M. (20 minutes for Supper); connects with **Sleeping Coach running Through from Rochester to Boston Without Change,** making but **One Change between Chicago and Boston.**

**NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running THROUGH from CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives at NEW YORK, 7:00 A. M.**

**9:00 P. M.** NIGHT EXPRESS
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)

**Leaves**—Twenty-Second Street, **9:15 P. M.** **Arrives**—Toledo, 6:35 A. M. (20 minutes for Breakfast); arrives at Cleveland, 10:35 A. M.; Buffalo, 5:30 P. M.; New York, 11:00 A. M.; Boston, 3:50 P. M.

## KALAMAZOO DIVISION.

Leave Chicago 7:30 A. M. Arrive at Kalamazoo 3:15 P. M.; Grand Rapids, 8:15 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 4:40 A. M.; Grand Rapids, 10:00 A. M.

☞ There being no heavy grades to overcome, or mountains to cross, the road bed and track being the smoothest and most perfect of any railway in the United States, this Company run their trains at a high rate of speed with perfect safety.

☞ Travelers who wish to SAVE TIME and make SURE CONNECTIONS, purchase Tickets via

## LAKE SHORE & MICHIGAN SOUTHERN R'Y.

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK CENTRAL RAILROAD and ERIE RAILWAY.

**General Ticket Office for Chicago, No. 56 Clark Street.**

**CHAS. F. HATCH,**
General Superintendent, CLEVELAND, OHIO.

**F. E. MORSE,**
General Western Passenger Agent, CHICAGO.

# ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST

## ST. LOUIS AND CHICAGO THROUGH LINE.

**8:30 A. M.** DAY EXPRESS, Sundays Excepted.
Arriving in ST. LOUIS at 9:30 P. M.

☞ This Train Reaches St. Louis ONE HOUR & FIFTEEN MINUTES in Advance of any other Route! ☜

**9:30 P. M.** FAST LINE. Saturdays Excepted.
Arriving at ST. LOUIS at 10:30 A. M.

AT ST. LOUIS, Direct Connections are Made FOR

**Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City,**

## LEAVENWORTH, ST. JOSEPH & ATCHISON,

—Connecting at KANSAS CITY for—

LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, &c.

## CAIRO, MEMPHIS AND NEW ORLEANS LINE.

**8:30 A. M.** CAIRO MAIL, Sundays Excepted.
Arriving at **Cairo** 2:20 A. M., **Memphis** 12:40 P. M., **Mobile** 9:40 A. M., **Vicksburg** 9:30 A. M., **New Orleans** 11:10 A. M.

**9:30 P. M.** CAIRO EXPRESS, Except Saturdays.
Arriving at **Cairo** 3:15 P. M., **Memphis** 2:30 A. M., **Vicksburg** 5:00 P. M., **New Orleans** 1:30 A. M.

**4:50 P. M.** CHAMPAIGN PASSENGER,
Arriving at **Champaign** at 11:00 P. M.

☞ THIS IS THE ONLY DIRECT ROUTE TO

Humboldt, Corinth, Grand Junction, Little Rock, Selma, Canton, Grenada, Columbus, Meridian, Enterprise,

## MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.

At NEW ORLEANS, connections are made for

GALVESTON, INDIANOLA,
And all Parts of Texas.

☞ **NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from 12 to 24 HOURS QUICKER than any other.**

THIS IS ALSO THE ONLY DIRECT ROUTE TO

## DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.

## Peoria and Keokuk Line.

**8:30 A. M.** KEOKUK PASSENGER, Sun. Excepted.
Arriving at **Chenoa** 3:15 P. M., **El Paso** 4:05 P. M., **Peoria** 5:40 P. M., **Canton** 7:14 P. M., **Bushnell** 8:59 P. M., **Keokuk** 11:26 P. M., **Warsaw** 12:05 A. M.

**9:30 P. M.** KEOKUK PASSENGER, On Saturdays,
**This Train will leave at 4:50 P. M.** Arriving at **Chenoa** 3:35 A. M., **El Paso** 4:25 A. M., **Peoria** 6:05 A. M., **Canton** 7:36 A. M., **Bushnell** 9:25 A. M., **Keokuk** 12:05 P. M., **Warsaw** 12:40 P. M.

THIS IS THE DIRECT ROUTE TO

## PEORIA, CANTON, KEOKUK, CHATSWORTH, FAIRBURY,

CHENOA, EL PASO, BUSHNELL, HAMILTON, & WARSAW.

Connecting at PEORIA for

PEKIN, HAVANA, BATH AND VIRGINIA.

—CONNECTING AT KEOKUK FOR—

Ottumwa, Eddyville, Oskaloosa, Pella, Monroe, Des Moines.

## Elegant Drawing Room Sleeping Cars

ATTACHED TO ALL NIGHT TRAINS.

☞ **SPACIOUS AND FINE SALOON CARS, with all Modern Improvements, Run upon all Trains.**

**BAGGAGE CHECKED THROUGH TO ALL IMPORTANT POINTS.**

☞ For Through Tickets, Sleeping Car Berths, Baggage Checks, and information, apply at the office of the Company in the Great Central Depot, foot of Lake St.

***Hyde Park and Oakwoods Train.***

| | LEAVE. | ARRIVE. | | LEAVE. | ARRIVE. |
|---|---|---|---|---|---|
| HYDE PARK TRAIN,... | *6:20 A. M. | *7.45 A. M. | HYDE PARK TRAIN,.... | *3:00 P. M. | *5:15 P. M. |
| HYDE PARK TRAIN... | 8:05 A. M. | 9.13 A. M. | HYDE PARK TRAIN,.... | *6:10 P. M. | *7:35 P. M. |
| HYDE PARK TRAIN,.. | *12:10 P. M. | *1:40 P. M. | | | |

* Sundays Excepted.

**W. P. JOHNSON, Gen. Pass. Agent.** **M. HUGHITT, Gen. Supt.**

# 1870. Great Central Route! 1870.

## SPEED! COMFORT! SAFETY!

# MICHIGAN CENTRAL and GREAT WESTERN RAILWAYS!

The Great Central Route, via Niagara Falls, to

## NEW YORK AND NEW ENGLAND.

## Pullman's Magnificent Palace Drawing-Room Cars,

— FROM —

## CHICAGO TO NEW YORK CITY, WITHOUT CHANGE.

**4 PASSENGER TRAINS LEAVE CHICAGO, DAILY EXCEPT SUNDAY.**
(DEPOT, FOOT OF LAKE STREET,) as Follows:

**5:00 A. M.** (SUNDAYS EXCEPTED.) MAIL TRAIN. Stops at all Stations.
Arrives DETROIT at 5:50 P. M.

**11:00 A. M.** (SUNDAYS EXCEPTED.) SPECIAL NEW YORK & BOSTON EXP.
Arrives at Michigan City 1:12 P.M.; New Buffalo 1:39, Niles 2:13, [Dinner], Kalamazoo 3:44 P. M.; Battle Creek 4:24, Marshall 4:43, Jackson 5:40, Detroit 7:35, London 11:15, Hamilton 2:00 A. M.; Toronto 9.20, Suspension Bridge 3:40, Rochester 6:50 A. M.; Albany, 2:40 P. M.; NEW YORK, 7:00, BOSTON, 11:50 P. M. ☞ This train connects at ROCHESTER (7:00 A. M.) with

**Wagner's Magnificent Palace Drawing-Room Cars!**

☞ RUNNING THROUGH TO NEW YORK, WITHOUT CHANGE! ☜

**5:15 P. M.** (DAILY.) ATLANTIC EXPRESS.
Arrives at Michigan City, 7:18 P. M.; Niles 8:30 P. M. [Supper]; Kalamazoo, 10:25 P. M.; Jackson, 1:00 A. M.; Detroit 3:40, London, 8:35, [Breakfast]; Hamilton 11:50, Suspension Bridge 1:30 P. M.; Rochester 5:10 P. M.; Albany, 1:50 A. M.; NEW YORK, 7:00 A. M.; BOSTON, 11:00 A. M.
A MAGNIFICENT DRAWING-ROOM SLEEPING CAR is attached to this train daily, FROM CHICAGO TO NEW YORK CITY. The celebrated

☞ **Hotel Drawing-Room Car is also attached to this Train from Chicago to Rochester!** ☜

☞ These, together with **ELEGANT DAY CARS TO SUSPENSION BRIDGE,** make this Train the favorite Train for all points East.

**SPECIAL NOTICE.**—Boston and New England Passengers will please notice that this Train now makes direct connection through. A SLEEPING CAR is attached at Rochester at 5.30 P. M., running through to Springfield, Mass., thus avoiding transfer at Albany. Breakfast at Springfield. This Train reaches Springfield early enough second morning to **Connect with all Trains** up and down the Connecticut.

**9:00 P. M.** (SAT. & SUN. EXCEPTED). NIGHT EXPRESS.
Arrives at Michigan City, 11:03 P. M.; Niles, 12:25 A. M.; Kalamazoo, 2:00; Marshall, 3:12; Jackson, 4:25; Grand Trunk Junction, 7:00; Detroit, 7:30; London, 1:45 P. M.; Hamilton, 4:35; Toronto, 9:35; Niagara Falls, 6:15; Buffalo, 7:15 P. M.; Rochester, 9:10; Syracuse, 12:25 A. M.; Rome, 1:55; Utica, 3:25 Albany, 6:30 A. M.; NEW YORK, 10:00 A. M.; BOSTON, 3:40 P. M.

**PULLMAN'S PALACE SLEEPING CARS ARE ATTACHED TO THIS TRAIN FROM CHICAGO TO DETROIT,**
And from Suspension Bridge to New York.

## WE INVITE THE ATTENTION OF THE TRAVELER to the SPLENDID EQUIPMENTS of this FIRST-CLASS LINE TO THE EAST!

☞ FOR THROUGH TICKETS, and any and all information, Sleeping Car accommodations, &c., apply at General Office in Tremont House Block, at office in Great Central Depot; also at No. 60 Clark street, under Sherman House; at Grand Trunk Railway Office, 48 Clark street, or at New York Central Railroad Office, No. 53 Clark street, and at office under Briggs House.

H. E. SARGENT, Gen. Supt. M. C. R. R. W. K. MUIR, Gen. Supt. Gt. Western R. W. HENRY C. WENTWORTH, Gen. Pass. Agt.

---

# CHICAGO, INDIANAPOLIS & LOUISVILLE

## THROUGH LINE!

—VIA—

## VIA MICHIGAN CENTRAL RAILROAD.

THE ONLY ROUTE TO

## TO LOUISVILLE, WITHOUT CHANGE OF CARS.

TWO EXPRESS TRAINS Leave Chicago Depot, Foot of Lake as Follows:

**8:00 A. M.** (EXCEPT SUNDAY.) MORNING EXPRESS.
Arriving at LaFayette, 2:25 P. M.; Indianapolis, 6:00 P. M; Louisville, 11:30 P. M.

**4:00 P. M.** (EXCEPT SATURDAY.) AFTERNOON EXPRESS.
Arriving at Michigan City 6:20 P. M. [Supper]; LaFayette, 11:30 P. M. Indianapolis, 2:15 A. M.; Louisville, 7:00 A. M.; Nashville, 4.00 P. M.

**A GOOD SLEEPING CAR is Attached to this Train Every Night,**
And goes from Chicago to Louisville WITHOUT CHANGE!

☞ **SPECIAL NOTICE.**—This Train stops at Michigan City for Supper, and waits at that point for Michigan Central Atlantic Express East, leaving Chicago at 4:45 p. m. Passengers going South, and wishing as much time in Chicago as possible, can take the 4:45 p. m. Michigan Central Atlantic Express, and connect without fail at Michigan City, with above Through Louisville Express.

☞ **THE GREAT BRIDGE ACROSS THE OHIO** at Louisville being completed, passengers are relieved of the omnibus transfer.

**FOR THROUGH TICKETS,** via this line, apply at offices of connecting lines and at all ticket offices in Chicago.

**HENRY C. WENTWORTH, Gen. Pass. Agent.**

---

# Michigan Central R. R.

LOCAL CONNECTIONS:

## Chicago & Michigan Lake Shore Railroad.

Open from New Buffalo to St. Joseph, Mich.

**8:00** A. M. AND **4:00** P. M. **Trains from Chicago Connect at New Buffalo.**

## Kalamazoo, Allegan & Grand Rapids R. R.

Open to Grand Rapids.

**8:00** A. M. AND **9:00** P. M. **Trains from Chicago Connect at Kalamazoo.**

## Peninsular Railroad of Michigan.

Open to Charlotte.

**8:00** A. M. AND **9:00** P. M. **Trains from Chicago Connect at Battle Creek.**

## Jackson, Lansing & Saginaw Railroad.

Open to Bay City, Mich. Passing through Lansing and Saginaw.

**8:00** A. M. AND **9:00** P. M. **Trains from Chicago Connect at Jackson.**

## GRAND TRUNK RAILWAY.

All Michigan Central Trains Connect at Grand Trunk Junction

— FOR —

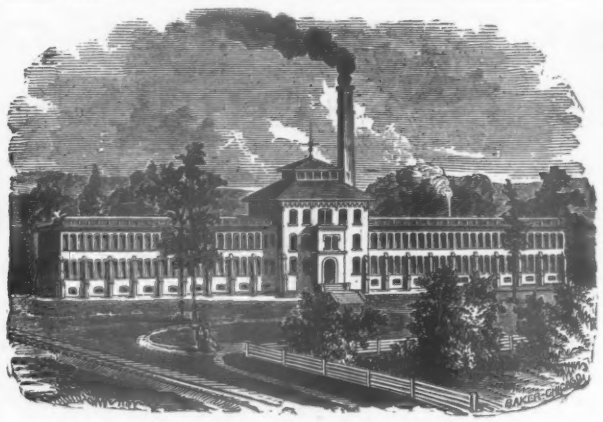
SARNIA, TORONTO, MONTREAL,

## PORTLAND, BOSTON, BUFFALO, OGDENSBURG

AND ALL POINTS EAST.

**H. E. SARGENT, General Superintendent.**

# Elgin Watches!



# Elgin Watches!

MANUFACTURED BY

# THE NATIONAL WATCH COMP'Y.

OFFICE GEN'L SUP'T U. P. R. R. } OMAHA, Neb., Dec. 16, 1869. }

HON. T. M. AVERY, President National Watch Co., Chicago, Ill.

Dear Sir—During the months that I have carried one of your B. W. Raymond Watches, it has not failed to keep the time with so much accuracy as to leave nothing to desire in this regard.

For accuracy in time keeping, beauty of movement and finish, your watches challenge my admiration and arouse my pride as an American, and I am confident that in all respects they will compete successfully in the markets of the world with similar manufactures of older nations. They need only to be known to be appreciated.

Yours, most respectfully,
C. G. HAMMOND, Gen. Supt.

OFFICE OF GEN'L SUP'T H. R. R. R. } NEW YORK, Jan. 17, 1870. }

M. AVERY, ESQ., President National Watch Co..

Dear Sir—The Watch made by your Company, which I have carried the past two months, has kept excellent time. I have carried it frequently on engines, and have been on the road with it almost daily. During this time it has run uniformly with our standard clock. Truly yours,
J. M. TOUCEY.

PENN'A R. R. CO., GEN. SUP'T. OFFICE, } ALTOONA, Jan. 19, 1870. }

T. M. AVERY, ESQ., President National Watch Co., Chicago:

Dear Sir—This Company has purchased and put in the hands of its engine-men, eighty "Raymond movements," which have given excellent satisfaction and proved to be very reliable time-keepers. In addition to these, quite a number of Elgin Watches have been purchased by officers and employes of this Company, all of whom have been well pleased with the efficiency and regularity of the movements manufactured by the National Watch Company. Respectfully.
EDWARD H. WILLIAMS,
General Superintendent.

AMERICAN MERCHANTS' UNION EXPRESS CO. } CHICAGO, Feb. 17, 1870. }

T. M. AVERY, ESQ., President National Watch Co., Chicago, Ill.:

Dear Sir—It gives me pleasure to state that the two or three Elgin Watches I have at different times purchased for presentation have given entire satisfaction, and are highly valued as elegant and correct time-keepers.

A very large number of your Watches are being carried by the Messengers in the employ of this Company, and are giving entire satisfaction, their time-keeping qualities being implicitly relied upon.
CHAS. FARGO.

MICHIGAN CENTRAL R. R CO. } CHICAGO, Jan. 15, 1870. }

T. M. AVERY, ESQ., President National Watch Co.:

Dear Sir—I have now been carrying one of your Elgin Watches, of the B. W. Raymond pattern, for nearly five months, and it affords me much pleasure to testify in favor of its time-keeping qualities, in which, after this length of time, I have great confidence. It has from the first run very close to the standard time, the slight variation being uniform, and susceptible of correction by careful regulation. My experience thus far justifies the opinion that it is a *very safe and reliable* time-keeper.
Respectfully yours, H. E. SARGENT.

OFFICE OF THE GEN. SUP'T. C. & N. W. R'Y, } CHICAGO, Feb. 16, 1870. }

T. M. AVERY, ESQ., President National Watch Co.:

Dear Sir—I have pleasure in expressing my opinion of the Elgin Watches, the more so since I do not think there is a better watch made. A large number of them are in use by our conductors and enginemen, and other employes, and I have heard no dissenting opinion upon their merits. They run with a smoothness and uniformity fully equal to any other watch I know of, and justify all your claims of excellence in manufacture and fitting of parts. Yours, truly,
GEO. L. DUNLAP, Gen'l Sup't.

LAKE SHORE & MICHIGAN SOUTHERN R. R. } CHICAGO, Jan. 27, 1870. }

T. M. AVERY, ESQ., President National Watch Co.:

Dear Sir—I have carried the Elgin Watch long enough to be able to pronounce it a first-rate time-keeper. I am making a very careful test of its performance and will soon give you the results. I think it will show that the West can produce Watches equal to to the manufacture of any part of the world. Yours, truly,
E. B. PHILLIPS,
President L. S. & M. S. R. R. Co.

OFFICE GEN. SUP'T ERIE RAILWAY, } NEW YORK, Feb. 7, 1870. }

T. M. AVERY, ESQ., President National Watch Co., Chicago, Ill.:

Dear Sir—Having for about three months tested, in various ways, the "time-keeping" qualities of one of your Elgin Watches, I most cheerfully award it the praise that it is due. For one month the Watch was carried by one of our Locomotive Engineers, and since by different persons, so that its full value as a time-keeper could be known under different modes of treatment. I will simply say that it has given *perfect* satisfaction, and in my opinion is as near perfection as I believe it possible a Watch can be made.
Respectfully yours, L. H. RUCKER,
General Superintendent.

☞ No Movements Retailed by the Company. } Business Office and Salesroom of the National Watch Company, Nos. 159 and 161 Lake Street, Chicago.

"THE RAILROAD TICKET PRINTING HOUSE."

**Rand, McNally & Co.,**
[TRIBUNE JOB OFFICE,]
THE LEADING
**PRINTERS, STATIONERS,**
ENGRAVERS,
— AND —
**Blank Book Manufacturers**
IN THE WEST.
Railroad Printing and Stationery a Specialty.
Consecutively Numbered Railroad Tickets,
Ticket Cases, Conductors' Punches,
DATING PRESSES, CANCELING STAMPS,
ETC., ETC., ETC.
**49, 51 and 53 Clark Street,**
CHICAGO.

**HARRISBURG**
**CAR MANUFACTURING CO.,**
Harrisburg, Pennsylvania,
MANUFACTURE
**Passenger, Mail,**
**Baggage, Box,**
**Gondola, Coal,**
AND ALL OTHER KINDS OF
**RAILROAD CARS!**
Railroad Car Wheels & Castings,
Bridge & Rolling Mill Castings,
Bridge Rods, Bolts,
—AND—
**RAILROAD FORGINGS!**
W. T. HILDRUP, *Superintendent.*
WILLIAM COLDER, *President.*

NEWS DEALERS
Should Address Orders for
**THE RAILROAD GAZETTE,**
— TO —
The Western News Company,
CHICAGO.

THE
**AMERICAN BUILDER,**
AND JOURNAL OF ART.
CHICAGO.
A PAPER FOR EVERYBODY.
*Every Architect, Builder and Mechanic Should have It.*
Its pages contain the best and most original designs, fully illustrated; and adapted for general use.
The original articles that appear in each number of THE BUILDER, together with its Original and Beautiful Designs for
**Cottages and Residences,**
make it worth many times its subscription price.
*TERMS:—$3.00 per Year.*
Address
CHAS. D. LAKEY,
115 Madison St., Chicago.

BLISS, TILLOTSON & CO.,
Manufacturers and Dealers in
**TELEGRAPH MACHINERY,**
— AND —
**SUPPLIES**
Of Every Description.
247 South Water Street,
CHICAGO, ILL.
L. G. TILLOTSON & CO., N. Y. | G. M. BLISS, CHICAGO.

# THE RAILROAD GAZETTE.

A Journal of Transportation.

**Devoted to the Discussion of Subjects Connected with the Business of Transportation, and the Dissemination of Railroad News.**

Illustrated Descriptions of Engineering Works and Railroad Machinery and Rolling Stock.

Contributions from Practical Railroad Men, on the Business of Railroading.

## A Complete Record of Railroad News.

*NEW ORGANIZATIONS.* *ENGINEERING AND MECHANICS.*
*PROGRESS OF NEW ROADS.* *TRAFFIC AND EARNINGS.*
*ELECTIONS AND APPOINTMENTS.* *LAKE AND RIVER NAVIGATION.*
*RAILROAD LAW.* *RAILROAD MANUFACTURES.*

**The Cream of the American and European Technical Periodicals.**

## An Impartial and Independent Journal, Valuable to Every Railroad Man.

TERMS OF SUBSCRIPTION:

Single copy, per annum,.....$3.00 | Seven copies, per annum, and one to the person who gets up the club.....$20.00
Four copies, per annum,.....11.00 |

CANADA SUBSCRIBERS, twenty-five cents additional.
EXTRA COPIES, ordered by the quantity, will be furnished at $5.00 per hundred.
SINGLE COPIES, ten cents each.
ADVERTISING RATES will be made known on application.

Address— A. N. KELLOGG, Publisher,
*101 Washington St., Chicago.*